



ANNUAL REPORTS
OF THE
FRUIT GROWERS' ASSOCIATION,
FRUIT EXPERIMENT STATIONS
AND
ENTOMOLOGICAL SOCIETY
OF ONTARIO.

—
1895



TWENTY-SEVENTH ANNUAL REPORT

OF THE

FRUIT GROWERS' ASSOCIATION

OF ONTARIO

1895.

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

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.



TORONTO:

WARWICK BROS. & RUTTER, PRINTERS, ETC., 68 AND 70 FRONT ST. WEST.
1896.



Digitized by the Internet Archive
in 2012 with funding from
Brock University - University of Toronto Libraries

CONTENTS.

	PAGE.
LETTER OF TRANSMITTAL.....	1
OFFICERS FOR 1896.....	2
ANNUAL MEETING.....	3
President's Annual Address : M. PETTIT.....	3
• Committees.....	5
Green Fruit—How can we Avoid its Flooding our Markets? A. M. SMITH.....	5
Apple Culture : E. HERSEE.....	8
Apple Growing in the Valley of the Upper St. Lawrence : HAROLD JONES.....	12
Experience in Shipping Apples to British Columbia : W. BOULTER.....	16
Question Drawer.....	19
Our Fruit Exhibitions and how to make them Educative : R. B. THORNTON.....	20
Notes on the Blossoming Period of Fruit Trees in Canada : Prof. JOHN CRAIG.....	25
Pear Growing for Profit : E. C. BEMAN.....	33
Profits of Fruit Growing.....	41
Top-grafting on the Tolman Sweet.....	42
Opening Remarks.....	44
Address of Welcome : T. H. PARKER, President Woodstock Horticultural Society.....	45
Response by Hon. JOHN DRYDEN, Minister of Agriculture.....	45
Private Conservatories : D. W. KARN.....	46
Ontario Agricultural College and Horticulture : Dr. JAMES MILLS.....	47
The Progress of Horticultural Work at the Dominion Experimental Farm : Prof. WM. SAUNDERS.....	49
Visit to Woodstock College.....	57
Question Drawer.....	58
Spraying and the Cultivation of Orchards : J. C. HARRIS.....	59
Experience on Spraying in 1895 : A. H. PETTIT.....	62
Present Day Requirements of our Fruit Trade : Hon. JOHN DRYDEN.....	68
Packing and Grading Apples : The SECRETARY.....	73
Export Trade in Apples and Other Fruits : Prof. JOHN CRAIG.....	77
The Improvement of the Gladiolus : H. H. GROFF.....	81
Public Parks and Gardens : G. R. PATULLO.....	84
The Cultivation and Management of House Plants : J. S. SCARFF.....	87
Garden and House Plants.....	90
Report of Nominating Committee.....	94
Treasurer's Report.....	95
Report of Finance Committee.....	95
Report of Secretary for 1895.....	95
Report of New Fruit Committee : D. W. BEADLE.....	97
Report of Committee on Fruit Exhibit.....	100
Methods of Originating New Varieties of Strawberries (Letter from E. B. STEVENSON).....	102
Our Export Trade.....	105
Report of Resolution Committee.....	115
 APPENDIX.	
Reports of Affiliated Societies.....	117-126
The Gladiolus : Mrs. E. J. PALMER.....	118
Insect Life : Dr. BETHUNE.....	122

TWENTY-SEVENTH ANNUAL REPORT
OF THE
FRUIT GROWERS' ASSOCIATION OF ONTARIO,
1895.

To the Honorable John Dryden, Minister of Agriculture :

SIR,—I have the honor to transmit to you the Twenty-seventh Annual Report of the Fruit Growers' Association of Ontario. The meeting at Woodstock was well attended by interested fruit-growers, and the subjects brought forward by the fruit experts from various parts of our province were of public concern, as, for instance, Spraying of Apple Orchards, Packing and Grading Fruit for Export, Causes of Barren Fruit Trees, etc. It is believed that the remedies under consideration will be the means of bringing to our fruit growers an era of more fruitful and consequently more profitable orcharding.

I have the honor to be, Sir,

Your obedient servant,

L. WOOLVERTON,

Secretary.

GRIMSBY, January 8th, 1896.

OFFICERS FOR 1896.

PRESIDENT :

Murray Pettit Winona.

VICE-PRESIDENT :

W. E. Wellington Toronto.

SECRETARY-TREASURER AND EDITOR.

L. Woolverton, M.A Grimsby.

DIRECTORS.

Division No. 1	.....	W. S. Turner, Cornwall.
Division No. 2	.....	R. B. Whyte, Ottawa.
Division No. 3	.....	Geo. Nicol, Cataraqui.
Division No. 4	.....	W. Boulter, Picton.
Division No. 5	.....	Thomas Beall, Lindsay.
Division No. 6	.....	R. L. Huggard, Whitby.
Division No. 7	.....	W. M. Orr, Fruitland.
Division No. 8	.....	A. M. Smith, St. Catharines.
Division No. 9	.....	J. S. Scarff, Woodstock.
Division No. 10	.....	John Stewart, Benmiller.
Division No. 11	.....	T. H. Race, Mitchell.
Division No. 12	.....	G. C. Caston, Craighurst.

AUDITORS.

A. H. Pettit	.....	Grimsby.
George E. Fisher	.....	Freeman.

THE ANNUAL MEETING, 1895.

The annual meeting of the Fruit Growers' Association of Ontario was opened on Wednesday, December 11th, 1895, in the town of Woodstock.

THE PRESIDENT'S ADDRESS.

Mr. Murray Pettit, of Winona, President of the Association, occupied the chair, and delivered the following address :

The season through which we have just passed will long be remembered by horticulturists as one of unprecedented frosts and drouths in almost all portions of the province. As a result the fruit crop has been more or less damaged, and in many cases ruined. The almost entire absence of fungus diseases have in a measure compensated the loss, and our markets have been fairly well supplied with a much better quality of fruits than in former years. The result of the drouth has been like a mathematical demonstration of the saying, "Good drainage, good cultivation, and plenty of manure, will enable land to stand almost any amount of drouth and still produce crops." I regret that I am unable to give any statistics in regard to the past season's crop, as it is impossible to gather anything reliable, even from local sections of the province. It is unfortunate that in this age, when every line of business is more or less dependent for success upon statistical data, that we have no better means of acquiring this information. During the past year many new horticultural societies have been formed, through the enthusiastic work of our old director and co-worker, Mr. Beall. These societies bring people together for the comparison and the enlargement of views. The local societies gather and formulate the experience and wisdom of the community. It is then brought to this Society to carry on and complete, and from one end of this province to the other to-day can be seen the deep imprint of organized horticultural activity. It is seen in the bending orchard, the burdened vineyard and fruitful garden. Fruit growing is becoming one of our great industries, whole farms are being planted and given the most scientific care and cultivation. Thousands of homes are fully supplied with fruits and flowers from their own gardens, and there is yet grand work to be done through organization. Should we allow the far-off valleys of California to supply the demand at our very doors that our own fruit should supply, annually taking thousands of dollars from this Dominion to support the fruit growing industries of another country while we are looking anxiously for markets? Does it not teach us that we must produce more good fruit, and less of an inferior quality; that we must cultivate, spray, fertilize and thin, pick, grade and pack better? When we notice the yearly growth of competition in the fruit markets, it becomes clear to us that the time has come when we must grow such varieties of the various fruits as we find succeed best in the various sections; in other words, we must make specialties of growing only such kinds as we can bring to the highest state

of perfection. A portion of our fine large apples and other fruits should be wrapped in paper to meet the demand of the better class of trade. The growth of the fruit-growing industry, and the rapidly increasing demand in the markets of the world for the very best, will compel us to take these advanced steps in our profession or be left in the rear to meditate over lost opportunities. The ratification of the French treaty will be a severe check on the rapid growth of the grape-growing industry of this province, and will increase the importation of foreign wines, as the conditions of this treaty will allow all countries the same privileges. The concessions made will involve a loss of revenue amounting to \$60,000 annually on the basis of importation from France in 1892. We fail to see why our wine-producing industry should be exempted from the full advantages conferred by the National Policy, and sacrificed to the interests of a foreign country. The developing of markets is one of the most important questions in connection with the fruit growing industry of this province. It is much to be regretted that the trial shipment of over ten tons of our choicest fruit to Great Britain was a failure; it is also a matter of congratulation that the Dominion Government has promised to make several trial shipments next season. At the last session of the Provincial Parliament the Hon. Minister of Agriculture introduced and carried a bill to suppress frauds in the sale of fruit. This is in the direction that this Association has always advocated, viz.: a better system of picking, grading and packing fruit, which means a greater consumption and more extended markets. While we are grateful for this, does it reach far enough? Should not the grower be protected? How much greater is his loss, when after purchasing, planting and cultivating an orchard for years, he finds it not true to name and of worthless varieties? Should we not ask for still more? New insects are continually appearing, also fungi not before observed, in different countries; trees from these countries are being imported every year into this province, and as the inroads already made by these enemies to fruit culture are a serious loss to the grower, should we not ask to be protected from such formidable enemies as the San Jose Scale and others, by the enactment of such quarantine regulations as now exist in California, which makes provision for all plants, trees, cuttings, grafts, buds, scions, seeds or pits brought into the state, to be disinfected on arrival at any point where they are to be unloaded; and for all peach, nectarine, apricot, plum or other trees, budded upon peach stocks or roots, and all pits raised or grown in a district where the peach yellows or peach rosette is known to exist, to be prohibited from being planted or offered for sale? Good results are already being seen from the amendments made to the Black Knot and Yellows Act. In my own township, where the diseases were spreading to an alarming extent, after vigorously enforcing the act for two years scarcely a vestige of the diseases remains; and it can, I believe, be entirely stamped out. The very thorough and complete system of spraying experiments conducted under the Provincial Government during the past season will, I trust, give us valuable results, and no doubt will be one of the most interesting subjects on our programme. It is such an important matter in our work and one in which there is yet so much to be learned that I trust we will be able to give it a good share of our time for discussion. Many improvements will yet have to be made before our spraying apparatus will reach the desired end

for which it is intended, without the loss of a great deal of time and patience. Any of them while new will spray pure water to perfection, but after one or two seasons' use with Bordeaux mixture they are failures. The question of forestry is of too great importance to be overlooked, in my estimation it overshadows all other questions of public economy to-day. The destruction of the forest areas has unbalanced the forces of nature, our climate is becoming full of extremes. The situation is one that challenges the attention of every thoughtful man. Wood lands should be preserved by absolute force where the Government has the right, and by all encouraging legislature where it has no control. To demonstrate the financial injury that is being inflicted on the present generation by the waste of material and the wrong that is being done to posterity by the destruction of young growths and germs of future forests by domestic animals should be one of the first duties of every society or association connected with agriculture, and this Association above all others should take the lead. The planting and beautifying of our school grounds, parks, cemeteries, homes and highways has received considerable attention from this Association, and will, I trust, receive still more.

COMMITTEES.

The following committees were appointed :

Fruit—Prof. Hutt, Mr. Race and Mr. Nicol.

Committee on Resolutions—G. R. Pattullo, W. M. Orr and A. M. Smith.

Committee on Nominations—The President nominated A. M. Smith and Mr. McNeill ; the meeting nominated D. W. Karn, T. H. Race and G. C. Caston,

The Secretary read letters of regret from J. A. Morton, Wingham ; R. B. Whyte, Ottawa ; Sir Oliver Mowat, Prof. Panton and Sir Richard Cartwright.

GREEN FRUIT: HOW CAN WE PREVENT ITS FLOODING OUR MARKETS?

Mr. A. M. SMITH, of St. Catharines, read the following paper :

I believe it will readily be conceded that anything that brings discredit upon the fruit business or creates distrust between the producers and consumers of fruit is a proper subject to bring before this meeting for discussion. In the past we have had the subject of dishonest packing—putting all the best samples on top of the packages and the culls in the bottom—discussed with good results, and there has been a remedy provided. Now there is another grievance among consumers, and though not of such a glaring character, yet it is one which if let alone may assume proportions that will seriously injure the trade. I refer to shipping green or immature fruits to our markets. Of course in shipping to distant markets some kinds of fruits require to be picked before fully ripe and will mature during and after transportation. Take pears, for instance ; while grapes if picked before they are ripe, though they may be partially colored, will never ripen or be fit to eat. Pears even and peaches if picked too green will not ripen, but will shrivel up and decay. But it is grapes more particularly, and fruit picked at this stage of immaturity that is the subject of complaint. There are a great many men, and I think they are closely related to the dishonest packers, who as soon as their fruit begins to color, hurry it off to market in order to get ahead of their neighbors and secure

a big price, thinking the scarcity and looks will sell it, not stopping to think or seeming to care about its effects upon the stomachs of the consumers or upon their own reputation as fruit growers. They remind me of a story I heard at a fruit growers' meeting in Rochester about a down east Yankee who was pretty sharp and had taken advantage of some of his neighbors in sundry horse trades and other deals, and among others had cheated a fellow by the name of Jones. It happened there was a protracted meeting in the place and a good many were converted, and among the rest this sharp Yankee saw the error of his ways and professed conversion. One night he got up in the meeting and told the brethren that he knew he had been a great sinner, but he was going to do better and if he had wronged any of them he asked their forgiveness, and if they would come to him he would make restitution. Next morning Jones was at his house long before daylight and rapped at the door. The man wanted to know what was up and what he wanted so early. "Wal," says Jones, "you know what you promised last night in the meetin', you said as how you was goin' to pay all of us fellows back you had cheated and I thought I'd get here 'arly, for I knowed there would be a terrible rush." These fruit growers think there is going to be a terrible rush and the market will be glutted and they want to get there first. The consumer buys it because it is the first in the market, takes it home before he has a chance to test it, and is disgusted with it. The children, who are willing to eat anything that is fruit, devour it, and there is a sleepless night and perhaps a doctor's bill to pay. In consequence that man does not bring home any more fruit for a month. This class of fruit is not ordered from the grower by dealers who have any regard for their reputation, but is consigned by him to commission men who generally sell it to retailers, who dispose of it to consumers. I have corresponded with some of the leading commission men in Loncon, Toronto, Ottawa and Montreal, and they all admit that it is an evil and hurts the market for better fruit; but they say it is a difficult question to deal with. They admit there are tons of grapes sold every year at high prices that are not fit to eat. People buy them because they are first in the market, but the retailers say they seldom come back for the second lot. The commission men of course do not like to refuse to handle this early fruit, for if they did they would lose the handling of the remainder of the crops, and it often sells at high prices and they make a corresponding profit. Nevertheless one of them told me he frequently had losses in handling it. His customers would come back after he had made returns to the grower complaining of its rotting on their hands and he had to help make good their loss. The only remedy suggested by them is from one who thinks the commission men should combine and refuse to handle it and thus drive it from the market. I leave the question with you, trusting some way may be devised to remedy the evil.

The SECRETARY: I think the evil of selling frozen grapes should be included with that of selling immature fruit. They were hurried into the markets, and people who tasted them did not want any more, and people who had stored good grapes in their cellars found no sale for them.

Mr. MCNEILL: This matter of selling green and frozen and immature fruit is doing a great deal of damage to the fruit grower, but the remedy suggested is only a partial one, though not altogether ineffective. Another partial remedy may be had in the matter of co-operative selling. It appears to me that in Ontario we are a little behind the times in selling our fruits; and many of these evils might be remedied if we could go in for some system such as is working on the other side of the line. Instead of shipping individually, if it were possible to ship co-operatively, and thus secure some union, the temptation to ship green fruit would be removed. Just so long as there is competition, immature fruit will be put on the market, because the man who ships the first fruit gets the highest price, and therefore he considers it essential that he should have fruit from his own orchard. I have orders for grapes every year if I can put them in at a certain date, and with the invoices of my first shipments I always say: "This fruit is not matured, and does not represent the quality of our grapes;" but I cannot afford to refuse to sell green fruit. We all do it; everybody does it. If people can get a colored fruit that looks all right they want it, and there is not a shipper among us that does not do it. The best price I get is from this immature fruit. We pick just as soon as it gets black, and

we have a greater profit from those vines than we have from any grapes on the farm. I am satisfied it is a loss to the fruit growers as a whole ; but it is a gain to me individually if I can put fruit on market a day or two ahead of my competitors. In our section, where the sale of grapes is in the hands of comparatively few growers, I do not see why we could not form a selling corporation among ourselves and have the results pooled, so as to remove entirely the temptation to ship immature fruit, and also ensure greater economy in the shipping. The same correspondent who now sells our crop will sell our neighbor's crop as well. The mere amount spent in securing market reports and in many other ways for my own would sell my neighbor's fruit as well, and I would be none the worse off, because we could sell for better prices, and the consumption, instead of being lessened would be increased, because we could open up markets for the whole of us that would not pay any individual to open up. If we had some such organizations as the Niagara Stock Fruit Company, and had them change their methods, so that instead of appointing agents in different cities and resting with that, they should secure contracts from growers, insuring that these agents had a supply of fruit that they could handle as best suited the needs of the market, it would not be very difficult to start with grapes and extend the plan to other fruits if it were found to work well there. Therefore I would commend to the fruit growers here this idea, and to urge upon this company, as it is already established and composed of reputable gentlemen whom we all trust, and endeavor to bring such pressure to bear upon them as would induce them to take up this plan and devise some scheme by which they can secure from growers their crops for sale, and handle it in that way without appointing agents. Not that they would abandon appointing agents entirely, but they should not rest on that system alone. I think the appointing of agents in some cases is not advantageous ; it is putting another middleman where there are too many already, but in some cases it would be necessary. The fruit exchanges in New York State and the grape districts on the other side and in the peach districts of Delaware State, work very satisfactorily. I believe it did not work satisfactorily in Michigan, but we have some representatives of that state here who might enlighten us.

Mr. WATKINS, of Michigan, said : We came over here not to give you any instruction in fruit growing or horticulture, but rather in order to learn something ourselves ; but if we can say anything that will help you we shall be only too happy to do so. (Applause.)

Mr. L. B. RICE, of Port Huron, Michigan : The question was asked by the President of our Society last week in reference to the matter Mr. McNeill refers to—why farmers and fruit growers cannot organize themselves into co-operative companies to build cold storage houses at the centres of shipment, and in that way have their fruit assorted and sent out under commission as he suggests—why it is that dealers so soon creep in and those things go to the wall ? Professor Bailey, of Cornell University, and others answered that we must first broaden the foundation of the business education of the farmer so that he will rise above these petty jealousies, and then we can combine ; so that your work has to go deep and thorough to ever succeed with these combinations. (Hear, hear.)

Mr. CASTON (Craighurst) : In the case of grapes, plums and peaches I think that growers find it necessary to pick them a little on the green side in order to have them stand for a few days in the basket, and the transportation companies and some expressmen do not give them very gentle handling, and fruit, with the exception of the pear, if picked before it is ripe, is to a certain extent insipid. Some varieties of the Roger's grape if picked before ripe are fit to eat, but other varieties are not ; and it is so with some fruit for canning purposes, which, as a rule, are picked a little too much on the green side. They come in contact in the grocery and fruit stores with California fruit, and the amount of the latter that is sold in this country is surprising. People will pay a little more for it. Mr. Orr suggests that it is on account of their dry climate that their fruit will keep much better. Theirs is grown in a perfectly dry atmosphere, while ours is grown in a moist atmosphere and cannot keep so long. This is a very difficult problem to solve. It is a question of quick transportation and sale more than anything else. Growers are afraid to leave their peaches and plums and other perishable fruit on the tree till they are ripe, because they know they will be in a bad condition when they are sold. You cannot ship apples to the North-west unless you pick them in a condition when they are

absolutely insipid. One of our dealers tried this plan last summer, but only the Duchess got there all right; the Astrachans he had a serious loss on. The Duchess is a splendid apple, and in high favor if you get it at its right stage; but you cannot get it at its right stage and send it any distance. I cannot offer any solution of the problem except quick transportation and quick sale.

Mr. MORDEN (Niagara Falls South): There is another question, of careful handling. The great difficulty we have to contend with in fruit transportation to-day is that it is bruised all to pieces. Last summer I sent a picking of berries to Buffalo, twenty miles away, and they were handled all right on the train, but when they got two or three streets away, by some race-horse methods that they adopted, they had those berries mashed, and almost destroyed the price of them. Now, if we could get a quick and careful transport a good deal of this difficulty would be avoided.

Mr. CASTON: Another question in regard to transportation might be mentioned. I never received a consignment of grapes that had not been broken open and quantities of them stolen. (Hear, hear.) A friend of mine had some peaches shipped to him and he would only accept them for what was in the basket. The express company tried to make him pay for the full amount, but he refused to do it, and finally they accepted pay for what was there. In some of the packages half of them were gone. It is simply disgraceful.

Mr. MCNEILL: That is the fault of the shipper himself. We have frequently had baskets opened, but make it a matter of principle to follow every such case to the bitter end, and sometimes I follow a case for six months till I get a rebate of perhaps a dollar on the shipment. In the winter months I take all these complaints and follow them up, and I have never failed to have the freight and expressmen make the loss good. I can say to their credit they have never failed, when I have brought home to them the undoubted proof of loss while in their hands, to have the loss made good. I have correspondence two inches thick over some trifling shipment where the basket was broken into. When carriers know they are being watched by the shipper they will not break them open. Shippers are to blame in not following up these losses by a persistent system of inspection.

APPLE CULTURE.

Mr. E HERSEE, of Woodstock, read the following paper:

We learn that the apple formerly originated from the wild crab of northern Europe, and now it is cultivated throughout the whole world, and the fruit we now enjoy is so entirely unlike the original species that we hardly recognize it as belonging to the same. Yet if we plant the seed of our most improved varieties it reverts to its original type, so by the good cultivation and the improved condition of the soil, with the workings of our experimental stations and of our fruit growers' associations, we have been enabled to bring to the front many new and improved varieties.

My idea in apple culture is to strive and improve on previous years' methods.

There are now in existence many notions in regard to cultivating the orchard, and these suggestions have led inexperienced people to suppose that no one but an experienced person could do the work. *This is a mistake.* I would say let us get acquainted with our trees, look at them, visit them daily; they need it. For example: Put a horse in a field and let it care for itself; will it do well? I think not. So trees need our attention and our daily visits.

My experience gained in planting a young orchard is that the growth must not be checked. We must not expect that a tree planted in the grass with simply a small portion of the sod worked around it will make the same growth that the same tree would if planted in cultivated soil. I would say a tree planted in cultivated ground will make three times more growth than one planted in the sod; the grass will exhaust the soil of its moisture and fertility, and the consequence is the tree will only exist.

The question is often asked, can I crop my orchard? This is an important question, but I would say, yes; such crops as the following have been found desirable for a young orchard, and then not too close to the trees. Corn is a good crop, as it does not attain much growth until most of the tree-growth is made. Potatoes are not so good, as the growth is at the same time as that of the trees. Also good crops of carrots can be raised, short-rooted sorts being preferred. A fall crop of flat turnips can be grown without harm. Strawberries, currants, gooseberries, rhubarb, can be grown without injury to the orchard. All this must be understood to be done under good cultivation and the free use of manures, stable manure being preferred, with an annual application of potash or wood ashes. My reason for suggesting the cropping of the young orchard with crops mentioned is this, that we are more liable to make free use of the cultivator than we would otherwise do if we had put it into grass or grain. But, as a rule, such crops will hardly pay after the trees are three years planted. The owner must then take his profit out in the increased value of his orchard, as I do not think it is wise to crop after that time. The cultivation of young orchards should cease each season about August 1st, as it is almost certain to prolong the growth, and the trees will be injured through the winter.

A few words about manuring. For young trees stable manure will always be found good, and the best time to apply it is in the fall, or very early in the spring. If put on through the summer it produces late growth, which is injurious to the trees. For orchards that have reached maturity, and are bearing heavily, manure can be used more freely, especially in the spring of the fruiting year, for a good many trees are weakened by their effort to produce a large crop of fruit, and especially if it be a dry season. Trees that are weak from fruiting or poverty of the soil are more subject and liable to disease. A good many fertilizers are now being manufactured which are profitable to use on the orchard, but I think bone and potash the best suited for producing fruit.

In conclusion, I would say the pruning must not be forgotten from the first year the trees are planted. They should have constant attention. Go and visit them every day if possible and see how they are doing. You will get to like them. What looks better on the farm than a well-pruned and well-kept orchard? Yes, and what pays better? Young trees should be allowed to grow with a close head. After forming the head, little is needed each year but to keep it balanced and regular in shape, pinching out the buds of those branches that are outgrowing the others. If it is found branches are crossing each other and are liable to come together, cut them out at once. Do not wait till they get large and then do it. This will injure the tree, weaken and shorten the life of it. And do not forget to let the sunshine and air into your trees.

I would say, lastly, to farmers and others, give your boys a start in growing fruits. They will learn early how to manage and care for them, and it will thus be a means of profit to both parties. Fruit appreciates good care and attention, therefore do not become disheartened. Become a member of the Fruit Growers' Association, read the *Horticulturist* and learn what it is and you will get your reward.

Mr. MORDEN: I do not know upon what grounds potatoes in orchards are objected to. I understand potatoes use a good deal of potash, and in a soil deficient in potash if we were to plant potatoes it might be necessary to restore the potash. If so, that would get over the difficulty. I have seen the practice of planting potatoes a year previous to the strawberry condemned because the potatoes are a potash crop. I would like to hear from gentlemen with more chemical knowledge than I have on this matter. Potatoes in many ways are very suitable. They are often dug quite early, you cultivate the ground quite frequently during the season, and also in digging the potatoes out.

Mr. HERSEE: The growth of potatoes is the same with that of the trees—that is, at the same time—and hence they are objectionable.

Mr. RACE: I made a point of planting strawberries in the fall after taking out a crop of early potatoes, and I have recommended that to the farmers.

Mr. GREINER (Niagara Falls, N. Y.): We have at various times planted potatoes amongst young trees in the orchards, and I do not think that the practice should be in any way objected to if the potatoes have the proper food and the trees have the proper

food. As long as you grow double crops you will use double manure. In regard to strawberries following after potatoes, it is exactly the same principle. With good culture, with the manure that the early potatoes usually receive—and we always manure early potatoes very heavy, more so than late potatoes—we think that the land is brought in the very best state for the succeeding crop. I do not see a single reason why we should not plant strawberries after potatoes. Of course the potato requires potash; therefore we usually feed potash manures a little heavier. If we use the concentrated fertilizers we take the special potato manures which contain a very high percentage of potash—sometimes as high as ten per cent.—or, as I usually prefer, we use the potash salts directly, unmixed, by sowing the same way as we sow grain over the land broadcast, and I have seen good results from that. On the whole it is a question simply of cultivation and manuring.

Mr. RICE: One of the points in the paper should not be overlooked—the one in regard to using suitable manures. We are troubled a good deal with dry seasons, and if manure is put on in the spring it is very apt not to assimilate itself to the soil, so we have to be very careful in applying suitable manures to the soil in the spring of the year.

Mr. MORDEN: When do you apply manures, then, to an orchard?

Mr. RICE: I should apply it late in the fall without cultivating it into the ground.

Mr. MCNEILL: You may plant an apple orchard and grow fruit well and do this as often as you please, but if you fail to get the right varieties there is no profit in it. The whole question turns on a matter of varieties. Thousands of trees in this province to-day are worthless because of not being the right varieties, and there are hundreds of farmers discouraged because they have no information on the proper varieties. As in grape culture, the money is made on two or three varieties.

The PRESIDENT: That was the case when these orchards were being planted; but now this Association has a carefully prepared list suitable to the different sections of this province and recommended for planting by this Association.

Mr. CASTON: The question of varieties is a question of locality to a very great extent. As to manuring, my observation leads me to the conclusion that the best way to supply nitrogen to the soil is to plow in clover. The mechanical condition of the soil furnished by a great amount of humus is a great advantage. Where we have a bare soil without sufficient humus the tree does not do so well apart from the fertilizing. We can supply a concentrated fertilizer having a large percentage of potash and a sufficient quantity of phosphoric acid and supply the nitrogen by plowing in clover. I never advise the seeding down of an orchard except with red clover that should be plowed under when it gets to its very best. Do not apply any stable or barn-yard manure at all to the orchard. It can be better furnished by plowing in a heavy crop of clover, and the other ingredients supplied by ashes.

Mr. TURNER (Cornwall): Mr. Caston has struck an important point in reference to humus. There is too much humus taken out of the soil and too little put back. I have grown a patch of strawberries for two years, and since the crop was taken off I cleaned out the patch and sowed red clover, and as soon as that was in blossom I turned it in. I expect to have some splendid soil for strawberries next year.

The SECRETARY: I do not think it should go out from our meeting that we do not recommend barn-yard manure for our apple orchards or for any of our garden plantations. I have always been under the impression that barn-yard manure was the best fertilizer that could possibly be applied, because it contains the various ingredients that we want to get in our orchards. It is the most complete fertilizer perhaps that we can apply; but because of the lack of barn-yard manure and the impossibility of furnishing enough of it for our orchards, it is necessary to use commercial fertilizers. In a barn-yard manure we furnish a certain amount of humus also. In regard to orchard crops, I think buckwheat is one that is easily grown and easily sown after we are through with our other farm work, and which cleans the orchard of weeds, and is in my opinion a very desirable crop—not quite so desirable as hoed crops, which mean a lot of cultivation through the summer; but buck-

wheat answers a good purpose and also saves us a large amount of work which we perhaps would not have time to do. Speaking of varieties, I think a good deal of the Cranberry Pippin. I do not know that it is widely known. I have a clipping from the *Produce World*, of London, England, which draws special attention to the Cranberry Pippin as being a desirable apple in the London market. A correspondent in Scotland to whom I sent a hundred cases of this apple this season wrote me a letter recently in which he said that it sells well just now, bringing a high price, but still he does not know about recommending it for a standard fancy apple for their market, which I had proposed it for. From Glasgow I hear very favorably concerning the apple. I packed 500 boxes and scattered them over Glasgow, Edinburgh and Sydney, N.S.W. When the reports come in I can tell whether this apple is going to succeed.

Mr. McNEILL : What are the defects of the apple ?

The SECRETARY : In some soils it is inclined to have little warts on it. It does not spot. For two years I have had the finest of samples. Its chief defect is in its quality, which is only ordinary like the Ben Davis.

Mr. CASTON : I believe they are growing that apple in some localities under the impression that it is the Gravenstein.

Mr. BOULTER (Picton) : I see by the heading of Mr. Hersee's paper that he is the proprietor of nurseries. I read his paper over carefully, and I must say there are a great many good points in it. However, we have learned a good deal by experience—a pretty good school, but the tuition is very, very high. I think one of the most important things to tell a man who is starting out, or an old man who is willing to learn, is how far apart to put his apple trees. In 1878 I put out 1,000 trees, 24x36. I was persuaded that I could grow as much again of fruit if I would stick another row in ; consequently I inter-rowed them. In the spring of 1879 I bought another thousand and put them out, 24x36, and I let them remain and did not inter-row. I have carefully kept those apple trees pruned very close, because I claim that every tree requires a peculiar manner of trimming. You would not trim a Spy like a Talman Sweet or a Greening like a Ben Davis. I made the serious mistake of my life in that orchard. I have carried out a good many experiments, particularly the washing of those trees every year with good strong lye made from good wood ashes. I burn up some six or seven acres of wood every year, and every pound of the ashes has gone on that orchard for the last twelve or fourteen years. After the trees are out seventeen years I have got to go to work and cut out that alternate tree or else not raise a crop of Northern Spys that will compare favorably with any others that are on the market, although the trees are all right and growing beautifully. You must let the sun and air into your trees to get the colored apples. Last spring I put all my manure on the orchard and plowed it in with a gang-plow. It was too dry ; I got no benefit from it this year. The frosts of last spring hurt my orchards fearfully. You can't grow a good Spy where the sun cannot strike it. You do not want your trees nearer than thirty feet.

Mr. BEADLE : Say forty.

Mr. BOULTER : It depends on how much land you have. If you have two hundred acres of land I would say spread them out.

Mr. RACE : You would not recommend these people to wash a very young tree with very strong lye ?

Mr. BOULTER : I would recommend as soon as the tree was out two years to wash it with very weak lye. Take one-third an ordinary run of ashes and two-thirds water ; and as the tree grows increase the strength of the lye. Do not be afraid to put it on strong as the tree is four or five years old, and you will have no lice, no moss growing on it and no rough bark. The bark on my trees is apparently just as smooth as the day they were put out. The tree should be looked after just as well as the ground upon which it is grown. A poor fellow down at South Bay told an agent, who had offered to put in his trees—that he wanted them put in “top down.” The agent asked what for, and the man replied, “because for fifteen years I have been putting them out roots down

and I can't make them grow." (Laughter). Every one of my two thousand trees I trimmed with a jackknife myself, and I did not leave a sprout over eight inches long on any one of them. You can grow a top any time you like. Get a good trunk and the top will come out all right. Too many put out trees and never trim and cut back. It is of the utmost necessity to cut the top well back the first year. I do not put anything in my orchard. I calculate that the trees will need all that the ground will produce. We go through it with a gang-plow when necessary, and we keep it worked up with a large spring-tooth harrow—just keep the weeds worked down and keep all the manure in it I possibly can. I believe nothing can be put on an orchard that is better than good wood ashes.

Mr. RICE: I find that when I put buckwheat on my land we have no cutworms the following season.

I sowed the buckwheat about the first of August, because I do not want to take it off my ground nor to ripen too much while my trees are young so as to harbor mice. Another thing we have to look at is, that if your ground is bare during winter, the rain that falls on it packs it harder and harder and does not sink into the ground, but runs off and is not there to be raised by capillary attraction the next year to furnish the moisture needed in your orchard. To prevent the rains from washing off the ground I mix a liberal amount of rye with the buckwheat so when the frosts come the buckwheat is killed down and forms a little protection with the straw, and then the rye comes on. In the spring plow your rye right under and go on with the cultivation of your soil. Thus you give the moisture to the soil, you protect your soil from the hard frozings, and all that sort of thing, and you furnish humus.

Mr. CASTON: I believe it possible from my own experiments to furnish the necessary manure to an orchard without the use of barn-yard manure at all. One of the most successful farmers in west Ontario considers clover the sheet anchor of farming. In regard to the time of plowing under, we find that clover is in that state early in June. We have sufficient moisture in the soil. If we plow it under, then we find in August when the drouth is at its greatest, that we have the ground in the very best mechanical condition; and I will guarantee that you can find the moisture within an inch or two of the top where that clover is plowed under.

APPLE GROWING IN THE VALLEY OF THE UPPER ST. LAWRENCE.

Mr. HAROLD JONES, of Maitland, read the following paper:

Before entering on the subject of this paper I will endeavor to give you an idea of how favorably we are situated for the growing of most of the hardier fruits.

The land draining into the river from Kingston to Cornwall, a distance of about 120 miles, is more or less adapted to fruit raising, but I will speak more particularly of that section lying in the vicinity of Brockville, where I can speak from personal knowledge and experience.

The general character of the soil is from clay loam to gravel and sand, and for a distance varying from one to three miles from the river is exceptionally free from late spring or early fall frosts; only once in my memory have we had a spring frost that would injure the grape blossoms, and we have never to my knowledge lost an apple crop through the same cause.

Among the summer and early fall varieties of apples that have proved hardy and prolific with us, I might mention the Yellow Transparent, Red Astrachan, Brockville Beauty, Duchess of Oldenburg, and St. Lawrence.

Of these the Duchess is without doubt the best paying of its season, well maintaining its character for hardiness and freedom from fungous diseases. The St. Lawrence, when kept free from spot, comes next in order of profit, bearing medium to large crops of large,

well-colored fruit. The Brockville Beauty is not as free-growing a tree as the two varieties just mentioned, but though a moderate grower, it produces immense crops of small to medium-sized fruit that takes well on the market owing to its excellent cooking qualities. The Red Astrachan is fairly productive, but owing to the defect in the tree of splitting at the crotches and unevenness in the ripening of the fruit, it has been grown to a very limited extent. The Yellow Transparent proves itself an ironclad in every respect, but owing to the fruit dropping so badly it has a very limited space in our orchards.

Of the fall and early winter varieties the standards are—Fameuse, Wealthy, Baxter or La Rue, Longfield, and McIntosh Red.

The Fameuse stands first of all in this section. The tree is a good free grower of upright to spreading habit, and bears very heavy crops of fruit, rather above medium in size, and colors almost to a crimson, bringing the highest price in our markets of any variety we have to offer of the same season.

The Wealthy ranks next in point of value. The character of the tree is somewhat similar to the Fameuse; though in some cases showing indications of blight; the fruit drops easily, and should be picked as soon as it gets color.

The Baxter is a hardy, upright grower, large, wide foliage, and bears moderate crops of large, handsome fruit.

The Longfield gives promise of becoming a very valuable variety; though inclined to over-bear, it gives a crop of medium-sized fruit that colors very well, the most of the apples having a decided blush, which, in contrast with the pure white skin, makes it appear quite handsome.

McIntosh Red seems hardy and fairly productive, but has been grown only to a limited extent in this section.

In winter fruits we have not been so fortunate in growing paying crops, though the Golden Russet, Canada Red, Pewaukee, Scott's Winter, Ben Davis, Yellow Belleflower, and Blue Pearmain are all hardy, vigorous trees.

The Golden Russet, when grown under favorable circumstances, such as thorough and continuous cultivation and liberally fed with fertilizers, will yield handsome returns, but when grown in sod it does not compare favorably with many other varieties under the same conditions, for the fruit will be small and undeveloped in color, flavor, and grain, and generally very few on a tree.

The Canada Red, though spoken of highly in some sections, proves itself a very unprofitable variety with us on account of its poor bearing qualities.

Of the other varieties mentioned the conditions are normal with the general reports from other parts of the province.

Of the two seedling apples shown on the table, I wish to draw particular attention to the one that is known in our section as the Scarlet Pippin. This apple originated in the vicinity of Brockville, and has been pretty generally planted in the counties of Leeds and Grenville. The fruit is well worthy of consideration by the Committee on New Fruits, and deserves a place in the list for judges at county agricultural fairs, as it is in good demand on the Ottawa and other markets, and is often called for by the commission merchants. The tree is an upright grower, vigorous and hardy, free from fungous diseases, and bears abundantly; season about the same as Wealthy or earlier, and the handsome color of the fruit will sell it at any time for dessert or cooking.

The large green or yellow seedling has been brought to my notice by one of my neighbors, Geo. Bowyer. He claims for it hardiness and productiveness in the tree, and exceptional keeping qualities in the fruit. He prizes it very highly as a dessert apple in May and June. Quite worthy of notice.

It is gratifying to note the readiness with which our orchards respond to cultivation, both in the growth of new wood and development of blossom buds, but where cultivation

cannot be practised owing to the spreading branches, I find that spreading swamp muck at the rate of about a load to four trees gives good results, as it keeps the ground cool and retains the moisture.

Of the insect enemies that trouble us most, I wish to speak particularly of the Cigar-shaped Case Bearer (*Coleophora Fletcherella*) that has infested our orchards of late years, causing immense damage to both trees and fruit.

In the spring of 1894 I first noticed this insect, and realizing the serious nature of the case, I devoted considerable time in carefully spraying that portion of my orchard most seriously affected. In August of that year I paid a visit to Mr. James Fletcher, Central Experimental Farm, Ottawa, and through his kindness and attention I have been able to learn the life history of the insect, and after working carefully under his wise guidance for seasons, I may say that on the whole I have made satisfactory progress in destroying it. Although this insect is not known in some parts of Ontario, it is surely working west, and it would be wise for every orchardist to read Mr. Fletcher's report on pages 201 to 206 in the Central Experimental Farm report for 1894, and be ready to battle with the first appearance of the worm. I have found the following plan of spraying to prove the most satisfactory when fighting the Case Bearer and fungi at the same time, viz :

- 1st. Spray copper sulphate, one to twenty-five gallons water, before buds open.
- 2nd. Spray Bordeaux mixture and Paris green just before blossom.
- 3rd. Spray kerosene emulsion, one to nine of water, immediately after spraying No. 2.
- 4th. Spray Bordeaux mixture and Paris green when blossom falls.
- 5th. Spray Bordeaux mixture and Paris green when fruit is half an inch in diameter.
- 6th. Spray kerosene emulsion, one to five of water about the first of October, or just about the time that young Case Bearers begin to leave the foliage and attach themselves to the twigs for winter.

I find this last spraying to prove of great advantage in reducing the number of insects that attach themselves to the twigs for winter, as I have observed in many cases that the insects do not leave the leaf, but fall with it to the ground and perish.

In the raising of plums, pears and cherries in this section there has been very little done, mostly owing to want of knowledge in varieties to plant, but I am confident from those planted that there are great possibilities before us, and in the near future I hope to be able to make a satisfactory report on these varieties.

Mr. JONES, in the course of reading his paper, said : I have had good results from spreading the barn-yard manure in February on the snow, then every year or two mulching the ground with swamp muck, about one wagon load to four trees or so, which keeps the orchard in a fine, healthy, cool condition, gives the apples a chance to attain very full size under severe drouth and keeps the sod so that you can lift it at any time with the manure fork and turn it over—in fact, the sod is half rotten all the time under this plan.

Mr. BOULTER asked for a description of the Cigar-shaped Case Bearer.

Mr. JONES: It appears the latter part of August and is then less than one-sixteenth of an inch in length. This small insect pierces the leaf, and passing in between the upper and lower surface, cuts that portion of the leaf on both sides of it and comes out with a little case on it. It leaves an oblong hole in the leaf one-sixteenth of an inch in length. Then it lifts itself on its head, as it were, right up like a little cigar, and it lives upon the leaf for the balance of the season while the leaf is green, and then in the fall of the year it crawls from the leaf to the twig of the plant and attaches itself to the twig and hibernates until the following spring, when it does the damage. In the spring it works up towards the blossom bud and the leaf bud of the twig, and as soon as the growth opens the insect pierces the stem of the blossom, and that is the most serious damage to the whole crop. Then, if they are very bad, they will

nip the foliage as it comes on. After the foliage and blossoms appear, then the insects pass along on the under side of the leaf, puncturing it, drawing themselves out of their own case, and eating along the membrane of the leaf between the upper and the under coverings; and that is where the difficulty in controlling them lies. They only attack a very small outer portion of the leaf, and that is on the under side, and then they eat along the under surface. They go on eating at the leaf till the first of July, when they appear as a fly or moth again for the August egg, and the history goes round again.

Professor CRAIG: I would like to bear testimony to the good work Mr. Jones has done in the matter of the Case Bearer. It is not in my department, but I happen to know that it is through his good offices and the intelligent and persevering way in which he has carried on experiments under Mr. Fletcher's direction that the solution of the best remedy for this insect has been brought to a successful issue. Mr. Fletcher has given me a memorandum to hand to Mr. Jones on the subject, but I see that it covers practically the ground that Mr. Jones has told you, with, I think, the sole exception that in the first spraying with kerosene emulsion Mr. Fletcher recommends using that mixture diluted at the rate of one to five instead of one to nine, which is the ordinary strength, that is, if you use it before the foliage, and Mr. Fletcher is of opinion that it is advisable to do that. The ordinary Riley-Hubbard mixture is diluted one to nine, and Mr. Fletcher recommends one to five.

Mr. JONES: Though I have not seen Mr. Fletcher's report, I judge from Prof. Craig's remarks that I was to add one more spraying to my present list, making it seven instead of six, because we could not do very well without spraying No. 3—that is, spraying just before the blossom opens. That is of great advantage in controlling the insect. If we have to spray with kerosene emulsion one to five that would be the seventh spraying merely.

Professor CRAIG: No; I think it was to take the place of one of the other sprayings.

Mr. JONES: Take the place of the copper sulphate spraying in the first place?

Professor CRAIG: I should think so, although it is not expressly stated.

Mr. JONES: I may say that I did the last spraying under the belief that the leaf has served its function as lungs to the tree, and it is ready to drop at any time, so if there is any injury to the leaf at that time it is no injury to the tree. The leaf has served its function by the first of October.

Mr. ORR: Would there be any danger of the emulsion affecting the trees injuriously?

Mr. JONES: No. I was able to use the emulsion without injury, and Mr. Guinard, Mr. Fletcher's assistant, has borne me out in that more than once.

The SECRETARY: If applied too freely there is danger in the use of pure kerosene. In destroying the bark louse I used kerosene very freely, and as it was a tree I could experiment on I smothered it with kerosene and applied it two or three times, and the bark shuffled off entirely; so I think it is possible to even destroy the bark itself.

Mr. MCNEILL: The necessity of careful observation in this connection is shown by the fact that Prof. Craig noted some insect attacking the leaf of the tree somewhat similar to the Case Bearer, and he drew the attention of Prof. Fletcher, who wrote me asking me to make some notes upon it. I looked at some trees I had and found to my amazement that there was scarcely a perfect leaf on the tree—that they were burrowed much in the same way as this Cigar Case insect—and I had never noticed it. It emphasizes the necessity of fruit growers being alert in the matter of observation.

Professor CRAIG: That insect Mr. McNeill refers to is the Leaf Sewer.

EXPERIENCE IN SHIPPING APPLES TO BRITISH COLUMBIA.

Mr. BOULTER, of Picton, read the following paper :

The subject assigned to me by your Secretary is one, I think, of vast importance to the fruit growers of Ontario, and, as all of us know, prior to the constructing of the band of steel now connecting us with this far away part of our Dominion, very little was known of this province. From all we could learn it was very rich in minerals and fish, that it possessed a beautiful climate, and great has been our anticipations since it has been brought into closer connections with its sister provinces to the east.

From personal experience, I know the subject I have selected will be well criticised as many persons who have interests at stake possibly will say I am wrong in my theory in saying that I believe Ontario will have to supply all the good winter apples this province will require. On my first trip in 1887 I paid a good deal of attention to the climate and the possibilities of fruit growing there. Three thousand miles away is a long haul by rail to ship apples for profit, and as my business is directly connected with fruit growing, I having sent the first car load of canned fruits and vegetables over the Rockies *via*. C. P. R. in 1886, which proved successful ; on my second trip I was determined to see if our winter apples, once introduced, would not come into demand. I was satisfied British Columbia could grow fine plums and pears, cherries, strawberries, raspberries, and some varieties of summer apples, but all the apple trees I saw were of a scraggy nature. The nights are too cool, and the weather is not warm enough to fully mature a good winter apple. In this I was borne out by a report from a horticultural association I saw published at Victoria in August, which said that after twenty-five years of trial they could not succeed in maturing fine flavored winter apples.

Our present Governor-General is spending large sums in the Okanagan district, believing that he can succeed. However, as he has plenty of money to spend, experience will teach him later on if he can be successful. In 1893 I sent out three car loads of the choicest Spys, Baldwins, Ben Davis and a few Golden Russets I could select, paying from \$2 to \$2 50 per barrel for them. As it was quite late, I sent them by the southern route—the Northern Pacific. They arrived in good shape and realized a fair profit at Victoria and Vancouver, and I was wired to forward two more cars of Northern Spys, but it was too late then to send a good article.

In 1894 I was earnestly requested to ship more, but the Legislature of British Columbia in that year passed a very stringent law regarding the importation of fruit liable in any way to be infected with any pests or fungous disease, and knowing that our fruit was not wholly clean from specks or fungus, I dropped out. But several cars were shipped, and on arrival were seized, and the total contents were destroyed.

The following extract from the Horticultural Board Act of British Columbia will explain :

Inspection of Imported Fruit.

“6. All importers of fruit must give notice to a member of the Board of Horticulture, or his agent, or the Inspector of Fruit Pests, upon the arrival of any and all shipments of fruit ; and all fruit and fruit packages imported into this province shall be inspected, and if found to be free from insect pests and fungous disease a clean certificate shall be issued therefor in conformity with the Rules and Regulations of the Provincial Board of Horticulture : Provided, however, that no fruit or fruit packages imported into this Province shall be removed from any dock, wharf, mole or station where such fruit and fruit packages have been landed before inspection and such clean certificate thereof shall have been obtained, and all such fruit and fruit packages as may be found infested with any insect pest or fungous disease shall be either destroyed by the importers thereof by such process as any member of this Board, the Inspector of Fruit Pests, or any agent appointed by this Board may direct, or shall be re-shipped by the importers thereof to the country from whence such infested fruit was exported.

Inspection of Imported and Home-grown Fruit.

"7. All fruit, whether imported or grown in this province, or exposed for sale, shall be subject to inspection under the authority of this Board, and if found to be infected with any injurious insect pest or the larva thereof, shall be quarantined or may be destroyed at the expense of the owner of said fruit by such methods as this Board or its agents may direct.

Stencilling and Labelling.

"8. All persons shipping, sending, or delivering any fruit, fruit trees, scions, cuttings, or plants within the province shall place upon or securely attach to each box, crate, or other package or parcel containing the same, a distinct stamp, mark, or label showing the name of the producer and shipper or sender, and the locality where grown, but boxes and barrels containing fruit shall be stencilled or stamped with letters not less than three-quarters of an inch in length."

On my annual trip this year, from all I could learn, the apples sent in 1894 were not fit to be shipped to any place, many of them being a small, miserable, scabby lot, full of codling moths, etc., and I did not wonder at the authorities in refusing to allow them to remain in the country. However, I refused to attempt this year to ship any, although promised a good price, as, from all I could learn, a few apples if found with any fungous disease would condemn the whole car load. Now, what is best to do? I noticed that all the apples at Victoria, coming from Oregon and Missouri, were packed in boxes of about fifty pounds each, and they can be easily inspected. I sent out some fine Spys to the several wholesale houses in this way, along with canned goods, to test them, and being carefully selected they passed through.

I believe a good trade can be successfully worked up by packing in this way, using the utmost care. Will it pay? Yes, I think it will. Freight will be lower, as more can be shipped in a car than in barrels, and unless the duty is removed I think money can be made in shipping apples to British Columbia. They must have our apples, as the Missouri, Oregon and Washington apples do not compare with them.

Mr. BOULTER added that he believed there was a good market for Ontario apples in Prince Edward Island, but the apples must be put up right, and he thought a good demand could be created.

Mr. CASTON: What does it cost per barrel to ship to British Columbia?

Mr. BOULTER: I used to pay \$1.10 per hundred pounds, one hundred and fifty pounds to the barrel. You can calculate about a cent a pound on apples.

Mr. SMITH: I would like to know how British Columbia happened to get such good Russets and Spitzenbergs and Baldwins as they had in Chicago at the World's Fair.

The SECRETARY: Yellow Belleflower also. The Spitzenbergs were finer than we have ever grown in Ontario.

Mr. BOULTER: I don't say that they cannot grow a winter apple in British Columbia; possibly they can in some very favored localities. I am speaking generally of the Province of British Columbia, and I am satisfied the climate is not right for growing apples.

The SECRETARY: Do I understand you to say it is because they do not grow vigorous trees they cannot produce the quantity they require?

Mr. BOULTER: Yes, partly that. Their trees are not vigorous growers, and I claim that a tree that is not vigorous growing tree never can produce first-class fruit.

Mr. HUTT: Is not their fruit much larger than ours?

Mr. BOULTER: It may be larger. They might pick out some very large apples and send to the World's Fair. Although they may have sent some to the World's Fair from some favored locality we will have to supply winter apples to British Columbia. Where you cannot grow real good corn you cannot grow good winter apples, and in British Columbia you cannot grow good corn.

Mr. RACE: This report we have received from Mr. Boulter seems to be very contradictory of a report we got two years ago from Chicago, which led us to believe that the Ontario fruit grower was in a very few years going to meet with very keen competition in the North-west and from British Columbia. According to Mr. Boulter we have nothing to fear at all from the competition likely to come from the Pacific Coast. Which of this reports are we to believe? If Mr. Boulter's paper is correct it is certainly encouraging to the Ontario fruit growers; but if the reports of two years ago that were given to us very largely by our own representatives in Chicago are correct, the apple of British Columbia is going to be a very strong competitor of the Ontario apple.

The SECRETARY: I think Mr. Pettit and Mr. Craig who are present will bear me out in saying that the beautiful pears and apples that were shown from British Columbia excelled any we had on exhibition at Chicago. It is very possible that in the parts Mr. Boulter has visited in British Columbia the apple does not succeed; but there must be some parts, though they may be very limited where it does grow to great perfection.

Prof. CRAIG: I was very much interested in Mr. Boulter's discussion, not only on general principles but on account of reference to the Experimental Farm—which, however, had nothing to do with the passing of the law restricting fruit which is infested by insects or fungi from going into British Columbia. We should consider first that British Columbia has a very diversified climate. You will find greater variations within shorter distances. On the lower part of our Experimental Farm at Agassiz we could not grow apples, but on the higher lands we could grow them to perfection, and we show you samples from there. A few days ago a gentleman at Linton sent me half a dozen varieties of apples grown on his farm, and I brought them along. In regard to insects, there is one thing that the fruit growers of British Columbia have not to contend with,—they have no codling moth in that province. You may just consider what that would be worth to you, and what you would do to get rid of it. I think they are justified in exercising every precaution possible to keep injurious insects out of the province. Neither have they any San Jose scale; and they are trying their best to keep their orchards clear from these pests, and they pay an inspector \$1,500 per year for that purpose. These specimens of apples I have here were grown by irrigation, and these are the districts where they are going to grow the finest fruit. In the coast regions they cannot produce apples of the finest quality, but in the interior regions where they have a much drier atmosphere and good soil and where they are able to irrigate, and also in other districts where they have just the amount of moisture with more cold, they can produce apples of fine quality and appearance.

Mr. CASTON: It seems as if the coast climate of British Columbia resembles very much the climate of Britain, and we do not find that they produce any long-keeping apples there.

Mr. RICE: But I must acknowledge to you to-day that I never saw a finer exhibit of apples than you are showing here; and in our market at Port Huron we have no apples this year; we have had to have our apples shipped in. We had some very fine, large, beautiful red apples, selling at \$1.75 per barrel. At the same time our buyers were begging for Greenings grown below Toronto somewhere—they did not know where, but on Canadian soil—and paying at wholesale \$3.25 per barrel—(Hear, hear). I never saw such Greenings anywhere in the world; and I thought then of what was said at one Canadian horticultural meeting,—“What will we do with the Rhode Island Greening? They are forced on to us; the tree men are making us grow it here in Canada, and it brings such a low price?” They decided that the only way was to refuse to buy it. What if you had refused to buy it when it brings such prices now?

Mr. A. H. PETTIT: I have never been to British Columbia to see the different parts where fruit is grown, but at the World's Fair we certainly had a beautiful exhibition of apples from that country of very large size, fine color and good quality. Yet, from what I could learn, I look upon that country as likely to be quite a market for Canadian apples; and why? Because their apples grow to enormous size, and are not of that keeping quality that we grow in the more northerly section of the country. The farther north you can grow an apple, if it is the home of that apple, the better keeping qualities

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

it possesses, and thus we will lengthen out the fruit season and give them a fruit of equal quality with their own, though perhaps not of that enormous size. At that exhibition there was a rivalry between the different states of the Union and the provinces of Canada as to which could show the biggest apple. I do not know which came out ahead, but they were of enormous size. The State of Idaho, under a system of irrigation, produces apples of enormous size and very high color indeed, but I do not think that class of fruit has the keeping quality that fruit has when grown in the more northerly portions of Ontario.

Mr. BEADLE: Do those apples have the same high flavor that our apples have that are grown in the northern climate?

Mr. PETTIT: No, I do not think so; neither do I think that our overgrown apples have. It is the medium size and color that gives you the quality in all cases.

Mr. DEMPSEY: I had the pleasure of comparing a sample of the Hastings apple that was grown in British Columbia this year, and I could not detect any difference between it and the apple grown on my place; the flavor was equally as good, though not so highly colored.

Prof. CRAIG: That was grown at Agassiz.

The Secretary introduced Mr. HASKINS, of Hamilton, who made a few remarks, saying he had not been able to give the question of fruit growing the consideration that he used to in olden times.

The meeting adjourned at 12.30 until 2 o'clock.

FIRST DAY—AFTERNOON SESSION.

The SECRETARY read a letter from the Michigan Horticultural Society, appointing Messrs. Taft, Watkins and Rice as delegates to this meeting. He moved that these gentlemen be invited to take part in all our discussions.

Mr. McNEILL seconded the motion cordially, as he had frequently enjoyed the hospitality of the Michigan fruit growers, and nowhere did he find a warmer welcome than in Michigan.

The motion was enthusiastically carried.

QUESTION DRAWER.

The Secretary read question No. 3 as follows: "How can the grape and rose thrip be destroyed?" and read a letter from Prof. Fletcher as follows:

"I notice among the subjects suggested for discussion at the Woodstock meeting question 3: *How can the grape and rose thrip be destroyed?*" I have had a good deal of experience during the past eight years with both of these insects. I have had no trouble in controlling either with the kerosene emulsion made by the Riley-Hubbard formula (two gallons kerosene oil and one gallon of soapsuds, containing one-half pound of soap) reduced with nine parts of water. If this mixture be sprayed forcibly through vines on trellises or into rose bushes at the time the insects are in the nymph condition it is a sure remedy. When the leaf-hoppers have acquired their wings two or three applications are necessary."

Mr. McNEILL: The rose thrip has begun to be a serious pest. I would like to hear about it from Mr. Orr.

Mr. ORR: The thrip has been troubling us a good deal for many years, but very much worse this year than in previous ones. About eight acres of grapes that I have were badly infested with them this year. The difficulty in treating the thrip is that they work entirely on the under side of the leaf. I understand that treating them with

a preparation of tobacco water or with the coal-oil emulsion is effectual in destroying them, but I have done nothing in that direction yet at all, from the fact that it seems almost impossible to reach them, and I would like very much to get some other opinion on the matter.

The SECRETARY: Mr. Fletcher said on two occasions in writing to me that he had no difficulty in destroying it with two or three applications of the kerosene emulsion.

Mr. MCNEILL: If it continues to increase it will be a very serious pest, but three applications is more than we could hope to give with profit at the present prices of grapes. I was hoping that we could learn how to knock it out with one application, or attack it at a certain period of its growth when we could get rid of it with very little trouble.

The SECRETARY read the question: "Are apple storehouses desirable for Canadian growers?"

Mr. DEMPSEY: I think it is desirable for any man that is producing from 500 barrels up to have an apple house. No one can understand the benefit to be derived from an apple house unless he has had one. It is very convenient to place the fruit in, and you are not compelled to sell the fruit right away; whereas, without a fruit house, you are often compelled to sell when prices are rather low. Keep them a month or so and you will nearly double your money. You can keep until April apples that are usually placed on the market say the fore part of January. Last winter from my fruit house I shipped on the first day of April to England Spys, Seek-no Furthers and many other varieties.

OUR FRUIT EXHIBITIONS, AND HOW TO MAKE THEM EDUCATIVE.

Mr. R. B. THORNTON, of Woodstock, read the following paper:

Although fruit growing is recognized as one of the most important branches of agriculture, yet no other industry is pursued with less intelligence by the great majority engaged in it. I refer more particularly to our farmers and their orchards than to the comparatively few fruit growers who have entered into the business for pecuniary gain or pleasure.

For proof, ask the army of agents who annually canvass the country for orders, how many men do they find who select stock, plant, prune, cultivate and care for their orchards and gardens in such a way as to make the enterprise every way successful and profitable. Or ask the fruit packers what percentage of the orchards are inviting to the shipper. Or ask the grower himself the names of the different varieties grown by him, and how few can give the names correctly.

The reasons for such a state of ignorance are obvious: 1st. Such a long time intervenes between planting and abundant bearing that if a mistake be made in planting it will be too expensive to attempt a remedy when your orchard reaches maturity. 2nd. Very few record the names of their trees when planting or can remember the names till bearing. 3rd. New and untried varieties are being pushed so hard by enterprising nurserymen that instead of promoting the interest of fruit culture the result is in most cases attended with disappointment, failure and discouragement.

Again, if you attend our local agricultural fairs and carefully study the fruit department year after year, you will agree with me, either that the various boards of directors have got into a rut, or else that fruit growing has reached the limit of its possibilities.

I believe in the exhibition of fruit, in giving prizes and in making the competition as keen as possible between growers if you would stimulate to success; but I do not believe that it conduces to the attainment of any of these objects to find a man on guard whose duty consists, not in describing, naming and showing the merits of new fruits, but

in guarding the fruit with a long stick, or giving you a hint to move on. I fear that very many exhibit fruit more for the sake of the paltry prize of fifty or twenty-five cents than because they have entered a contest in which forethought, science and skill combine with nature to win praise, admiration and success.

To make an exhibition of fruit educative I would suggest the following :

1st. Revise the prize list by leaving out such kinds as do not possess sufficient merit to deserve general cultivation in that particular district.

2nd. Print in the prize list opposite the name of each kind of fruit a score of merit marks as at present accepted by the Provincial Association of Fruit Growers, basing the award of prizes upon this score.

3rd. Distinguish in the list between summer, fall and winter varieties, and keep them separate on the exhibition tables.

4th. Give exhibitors the option of any six varieties out of the total list of old kinds, subject to the score as printed in the prize list, at the same time increase the value of the prizes for first, second and third in said groups.

5th. Attach a printed label to each plate of fruit in type large enough to be read outside the guard rail.

6th. Engage one qualified judge, who alone will be responsible for the way prizes are given. Pay him for his time and require him to remain with the fruit each day until the close of the fair ; to answer questions and give such information as may be required.

7th. Let the Provincial Association request the Government, through the Minister of Agriculture, to send an expert judge of fruit to at least one fall fair in each county annually until each society in turn shall have the benefit of his knowledge and judgment.

8th. Add the names of such new varieties of fruit each year to prize list as shall in the judgment of the Provincial Association deserve a place in the list.

9th. Offer special prizes for new varieties not on the list which are accompanied by a description of their respective merits. The kind of soil where grown, age of tree, or anything else that may entitle it to favorable consideration.

The SECRETARY : I would like to emphasize the point in regard to labelling. One of the difficulties which visitors to many fairs have is to find what the varieties are. They will strain their eyes and necks and with the greatest difficulty try to decipher some very poorly-written names attached to the fruit, and possibly fail after all to make out what they are. One of the benefits of visiting these fairs is to ask about new varieties and become acquainted with them. Therefore some plan should be found by which fruit would be labelled with printed names elevated in such a way that they could be read by every passer-by. I think we should keep very clearly in mind that the object of fairs is educative, to give information, and therefore there should be somebody on hand to answer the questions of visitors in regard to the exhibits in the room.

Mr. BOULTER : At our meeting last night steps were taken that will lead to proper persons being selected as judges at these fairs. Usually some straight-laced fellow is put in charge of the exhibit, whose whole object seems to be to keep visitors moving on. There is no information given at all, and persons are allowed to look only about five minutes before they are asked to move on. Experts should be appointed who could give information. A committee has been appointed to select good judges and recommend them to the Toronto, Ottawa and London exhibitions, and perhaps these recommendations will be extended later on.

Mr. MORDEN : There is a matter that ought to be touched upon more fully, namely, the disappointment that arises from sending out high-priced, highly-lauded varieties. We find that people with small lots in towns have them filled up with material that is of no use, and that is taking the place of something that will produce fruit. Farmers are planting new things, unknown, untested, probably good for nothing. At the Nurserymen's Convention at Niagara Falls, N. Y., I urged that no new fruit should be sent out until it had been tested at a large number of independent stations, and if it had merit the orig-

inator would get a free advertisement. It would become known through the whole country that it was a good fruit. If it was good for nothing it would end there ; and that is the way it should be. Instead of that our nurserymen are trying to get hold of a wonderful novelty. They can make novelties to order out of any old variety ; and the largest nurserymen are sometimes the largest offenders. They send out a hundred agents, each of whom is instructed to push this variety, and it is pushed on to every farmer, and ninety-nine times out of one hundred it produces nothing, and it is taking the place of something that would produce fruit. We had a very close vote in the Nurserymen's Convention, but I found it a failure to get a vote there. I asked, too, that the nurserymen's catalogues as issued should be a reliable guide. We find that fruit is described in the flaming colors of the originator. You will find the champion grape described as of excellent quality, and all that sort of thing. This Association should demand that catalogues should be reliable. It is certainly very discouraging to every planter to get varieties that are worthless ; and a great proportion of this high-priced stuff is not worth planting at all.

Mr. SMITH : I think that planters are a good deal to blame themselves in not informing themselves in regard to varieties that are adapted to their locality, and for taking the word of every travelling agent that comes along. I should think by this time that a good many of them would begin to learn that it is not all gospel that the tree agent talks to them. I think we are making a step in advance in this direction. If local organizations, such as the Society here, would take pains to have their exhibit correctly named, it would be a step in an educative line as suggested by the paper.

Mr. MCNEILL : The Government think so much of our bodily health that they license doctors for fear we will not know enough to get the right man to cure our bodily ills ; they think so much of our pockets that they will not allow an auctioneer to sell stuff unless he is authorized by license. That is paternalism in a mild form. It has always been so, and we get used to it. Still they allow men who want agents at three dollars a day to advertise that "no experience is required." (Hear, hear, and laughter.) And it appears to me that it would be a step in the right direction to have fruit men licensed. I believe that the business then would rise to a dignity that it has not now. (Hear, hear). I have leisure sometimes, and could probably make an honest dollar by selling fruit, but I am ashamed to appear as a tree agent. (Laughter). If I paid a license and could reply upon my respectability and have something to show for it, I believe that I might do something in that line. Seriously, I believe it would be a step in the right direction to protect the farmers and those who are not informed and that cannot reasonably get themselves informed upon varieties, by seeing that only men who are responsible should be allowed to sell these things. Stockmen are now seeing that horses are licensed, and in every way they are protecting those who cannot reasonably inform themselves on these subjects ; and why should the country be flooded with tree agents that are parasites, and that keep respectable men out of the business ? (Applause).

Mr. SMITH That plan is adopted in some western states.

Mr. RICE : The trouble with us in Michigan is that we allow anybody that has a good tongue to talk and lots of brass in his face to go out and beat the poor man, and the consequence is they drive respectable men out of the business. It is the fault of nurserymen. I was riding with one of the leading nurserymen of Rochester, N. Y., and I said to him, "Mr. B——, do you instruct your agents to recommend the Russian Mulberry to people through the country?" "Mr. Rice, we sell just what people want. That is our business." "Mr. B——, how would people know that they wanted the Russian Mulberry if your agents did not tell them so?" Still the answer was, "we raise and sell what people want." I asked him the question in another form. He says, "Mr. Rice, let us talk about something else." (Laughter). Now, it is the money that is in these things that makes the nurserymen take this course. They will put a novelty on. They will say to a man, "go and I will give you so much a day." The tree will cost him perhaps ten cents or five cents. He reasons—he does not tell the man so—"you sell that variety ; you tell them it is something new and here is a flaming picture of it, and it is nicely described ; tell them there was nothing like it ever grown in the world before and it will

bear the next year after you set it out—(Laughter)—and not only that, but it is the most beautiful tree next to the Tree of Life almost, and fair to look upon, and everything and you ask \$1.50 for that tree.” Now then, you see if this man gulls three men in a day he more than pays his wages; whatever else he does is clear profit. So that by making a specialty of that kind they can afford to pay good wages to anybody that has got a voluble tongue and a brassy face.

Mr. A. H. PETTIT: I do not think at the present time we suffer to the extent that we did a few years ago with this tree agent business in this country. I think that our farmers and fruit growers, as a rule, have become very much better posted than they were in the early days of this work, and, no doubt, in the early history many mistakes were made. We have been discussing this question for years as a Fruit Growers' Association, and we appealed to the Government for a grant along that line to establish throughout the province at suitable points, and to represent certain localities, fruit experiment stations, where all the new kinds of fruit recommended by these people for cultivation will be thoroughly tested and reported upon, in order that every information can be given to the people in advance as far as it is possible to do so. These stations are doing most excellent work, and the work is coming on as rapidly as it possibly can. Another effort we are making is to have at the great Industrial Exhibition at Toronto, where the largest possible number of people attend, an exhibit of the large variety of fruits the stations are testing, and give all the information we can as to the hardiness, productiveness and good quality of such varieties as are placed before our people to plant, and therefore to buy. I think this difficulty will be overcome in a very few years. I think the evil will cure itself very rapidly. Another point is in regard to cultivation. I think horticulture is as fairly and well done throughout Ontario as any other branch of agriculture. It is becoming better and better every day, and travel where you will to-day you will see many samples of orchards that are well cultivated, well pruned and very well cared for. (Cheers.)

Mr. WATKINS, of Michigan: I think the manner of handling the tree list by our Society is a good one. Every year we have a complete list of everything that is worthy of cultivation, and some that are not. We have a committee that revises that list every year. If a variety should become unworthy of cultivation, it is struck out. New ones that are tested at our sub-station, under the careful supervision of President Lyon, are put on the list, and that revised list is a very valuable feature. Our list of apple trees in trial now is nearly 300, and there are two trees of each variety, and they are fruited right along from year to year until they become what you might call standard.

Mr. RACE: We have not heard anything at all from any local men.

Mr. T. H. PARKER, President of the Woodstock Horticultural Society: Our local association undertook to correct the names of much fruit that they believed was improperly named. They sent for Mr. A. McD. Allan, who was experienced in that line, and he spent a day or two here and also visited St. Thomas and Ingersoll, and I was with him at some of these places, and it was really amusing to see the strange names that some of these apples had, and many of them were wrongly named. The thing was not followed up, and I do not suppose that much benefit was derived from that single visit. It seems to me that the matter rests a good deal with the local societies. If they were willing to expend a few dollars in engaging an expert to attend their fairs and act as a judge and correct the names of these fruits, it might be a very great benefit to the country generally.

Mr. LEITH, Woodstock: I think very often mistakes are made in the placing of labels on apples at all, because they are not true to the names placed on them. I have made it a point to get the proper names of certain trees in my own orchard that may be starting to bear, and when I go to an exhibition, or a display like the one you have here, I look very carefully at labels on fruit, supposing they are placed there by men who ought to know, and I go away with the impression that I have got the correct name, but sometimes I find afterwards that it was not the correct name.

I am sure the great majority of people who go to our agricultural shows pay very little attention to getting information from the displays of fruit, and anything that will give them the correct names of certain fruit, I think, would be desirable.

Mr. THORNTON: I have attended a large number of local fairs in this county, both this year and last, and know of only one fair in Oxford county where they labelled the fruit. That was at Embro; and the thought struck me that the idea should be embodied in every exhibition throughout the Province. Hence I wrote this paper. I believe it would do a great deal in educating the people in regard to fruits. I know there is a very general ignorance by fruit growers as to the names of their fruits. They may know what pleases them and what gives them satisfactory returns in their own orchards, but they do not know what would be the most profitable to grow for market, because they are not generally sufficiently well informed. In attending some of our own local fairs, I noticed many fruits exhibited that were wrongly named, and I also noticed that many judges knew absolutely nothing about it, except a few varieties. Last year at a very important fair in our county the first prize for Baldwins was given to a collection of Spitzenbergs. (Laughter.) This year at one of our fairs the judge said, as he passed around (I was standing near by): "I don't know anything about pears; I will just award prizes according to their appearance;" and he passed on the whole in that manner. I suppose people who received the prizes went away with the idea that their particular fruit was the best on exhibition; and some of them were incorrectly named, and yet they obtained the prize.

The SECRETARY: We were up at Clarksburg not long ago, and a gentleman showed us a very fine tree of pears, and he said: "You see what fine Louise Bonne pears we have here." I said: "Those are Clairgeau." He said: "That can't be; they have taken the prize for Louise Bonne at the exhibition here for years."

Mr. RICE: You conduct your exhibitions here very different from what we do. With us, if you can't read the label plainly, you can take it up and handle it, and nobody will find any fault. A man will walk along and have a little word with you, and there is nothing said to hurt your feelings, or anything of the kind. I visited your fair in London and never saw such a beautiful display of fruit, but there was scarcely a name I could see. I put my hand down to pick up a label and heard a loud voice say: "Hands off!" I was frightened. Everybody was looking at me. Up above everybody stood a man with an eagle eye watching. I did not know what to do. I went to one of the directors and I said: "My dear sir, I am from the United States, and I want to look at your fruit; I wish you would tell that man up there not to shout at me again—he frightens me." (Laughter.) He called up and said: "Let this man look at anything he wants to." I went around then and spent two hours looking over the fruit, and I then found out that when the man shouted "Hands off!" he had no reference to me. (Laughter.) If you could have more confidence in each other, it would be better. Don't be so dishonest among your neighbors so that nobody can trust you—(Laughter)—and do be more honest among yourselves, and tell yourself that you won't steal anything, and let your neighbor find that out, too, and then when you go in to look over this fruit you will have a great deal better chance. (Hear, hear.)

Mr. MCNEILL: That is the John Bull of it. Down at Montreal some of the finest grounds are enclosed with walls of stone six feet high, and I felt like getting dynamite and blowing them down. Whenever you see that big six foot wall you may know it is some hard-headed fellow from England or Scotland.

Mr. WATKINS: We have taken down all our yard fences and opened the street. (Hear, hear).

Mr. MORDEN: That is what we do at Niagara Falls, Canada, too, in addition to those things mentioned by Mr. Thornton.

Prof. CRAIG: There are one or two other ways in which you can obtain the names of your varieties—because that is one of the most important features along the educative side, of value in our fall exhibitions. You have your provincial society here, the pro-

sident and secretary of which are experts ; then you have at Guelph a horticultural division with Mr. Hutt as professor of horticulture, who will always be glad to identify specimens for you as far as he can if sent to him ; and lastly at Ottawa you have an institution that is willing as far as possible to aid in this work, and any specimens you may send to me as horticulturist of the Experimental Farm I shall be very pleased to examine as fully and as far as my other duties allow me. You may send specimens free to the Experimental Farm. Then you have an important committee in connection with this Association that is doing excellent work—the Committee on New Fruits, of which Dr. Beadle is chairman, whose duty is to investigate the merits of all seedlings and fruits without name, including new varieties to be put upon the market. Now if you will send samples to me at Ottawa I shall forward them after examination to Dr. Beadle and to Mr. McD. Allan, who is also a member of that committee and our combined observations are presented at the annual meeting. We are thus able in a measure to keep track of new varieties.

A DELEGATE : Would you send one apple or two or three ?

Prof. CRAIG : It is always better to send four or five specimens, because it is very difficult to get one apple that is exactly representative of its type. If you have five or six, then I can send one to Dr. Beadle and one to Mr. Allan, so that we can make our report much more conclusive and valuable. I trust that you will bear in mind these suggestions and act upon them.

THE BLOOMING PERIOD OF FRUIT TREES.

Prof. CRAIG : Those who attended the meeting at Orillia, will remember a very excellent paper we had from Professor Beach from the Experiment Station at Geneva, N.Y. He gave us some very valuable information in regard to the blossoms of fruit trees, and the power of the blossoms of the different varieties of grape vines to fertilize themselves and so set fruit. This investigation was instituted by Professor Waite of the United States Department of Agriculture at Washington. Mr. Waite worked on pears, and the results of his researches opened up a very wide field for investigation, and it was somewhat in extension of that work that I began work on the apple blossom. I may say, however, that the work was begun previous to this season. My object at this time is to present to you in a very crude, but I hope suggestive way the results of these investigations, more for the purpose of asking your co-operation and for getting the fruit growers of this province thinking about this matter, than to give you very valuable information at this time—though I think there are some points that will be of interest and value to you.

NOTES ON THE BLOSSOMING OF FRUIT TREES IN CANADA.

BY JOHN CRAIG, HORTICULTURIST, CENTRAL EXPERIMENTAL FARM, OTTAWA.

The cause of the unfruitfulness of orchards has always at horticultural conventions and elsewhere been prolific of much surmise, conjecture and I may say variation of opinion. The possibility of the trouble existing at least in part in the blossom has been mooted only in recent years. As a rule, I think we are prone to lay too much stress upon a single feature in the management of an orchard, and too little upon the collateral practices which make a harmonious and well balanced programme in the life of the average apple orchard. Some orchardists pin their faith to varieties, others to location and cultivation, others again to manuring or pruning, and perhaps still others—though I have not yet heard of them—to spraying. Undoubtedly we cannot expect orchards in which the trees are so closely planted as to be fighting for the mutual ground and perhaps for nourishment at twenty years of age to continue long and of healthy and fruitful condition. In passing, I may say that in certain localities with certain varieties

close planting is desirable and may be practiced with profit, but this is the exception. Nor is it reasonable to expect trees to continue to yield profitable crops of apples year after year, when year after year we are taking away from the soil and putting nothing back.

But granted that the trees are planted at the proper distances apart, that they are cultivated, pruned and manured reasonably and rationally, we do not in most cases reap entire success unless the previous good treatment has been followed up by judicious and well directed efforts, having in view the destruction of injurious and noxious insects. There are instances on record where even after all this labor and all these various precautions have been taken that the orchard still remains obdurate and refuses to bear defying all attempts to coax it into fruitfulness. One says root prune to stop superabundant growth; another says top prune to let in the light; another says give manure to stimulate; another, seed down to check growth; and still another, spray to induce fruitfulness. All these counsellors may have been listened to, their advice acted upon, but still without success. We then begin to observe the conditions which surround orchards of a similar character. As a rule these observations lead to the conclusion that orchards made of varieties intermingled are more fruitful than those in which the varieties are separated and planted in large blocks. Professor Beach, in his admirable address on this subject, before the Association at Orillia last year, cited a remarkable instance of this kind. The orchard was made up in part of Baldwins and of Greenings planted in blocks and in part of Baldwins and Greenings mingled with other varieties.

Where the two varieties mentioned were planted in blocks unmixed with other kinds they were unfruitful, but when mingled with other varieties the converse was true. This points at least to partial infertility of the blossom with its own pollen and points to the desirability of intermingling varieties in the orchard. In the case of certain varieties of American plums this belief has prevailed for some time and no doubt is well founded. The valuable investigations of Professors Beach and Waite upon grapes and pears clearly set forth a similar condition of affairs in the case of these fruits. Similar experiments with apples have been commenced at Ottawa, but need further confirmation before they can be announced with authority. In connection with these experiments an attempt has been made to secure records of the blossoming period of the different classes of fruits in the Dominion. To obtain such a record was only possible to the kind co-operation of the fruit-growers of Canada. It gives me pleasure to acknowledge the hearty and kind manner in which they have aided me in this work. The weather was most unfavorable, however, for obtaining records which could be considered representative of normal seasons. We all remember the extreme heat of early spring which hastily awakened our fruit trees into blossoming activity, having finally the effect of crowding the whole blossoming period in some districts at least, into the compass of a few days. This so disturbed the natural blossoming periods of all fruits as to render the records only relatively correct, both as to periodic difference between varieties and the annual date of occurrence. Before going into the remainder of the subject, it might be interesting to us for a moment to look at the construction of the normal apple blossom.

THE APPLE BLOSSOM.

The apple blossom exhibits a characteristic peculiar to the pomaceous division of the rose family. On making a vertical section of an apple blossom we find the organs composing it to be arranged as follows, beginning at the outside, first, a calyx or enveloping and protecting sheath composed of five parts called sepals; second, the delicately coloured corolla, also of five parts called petals. These two series serve to protect the delicate organs within from heat and cold and also attract to the blossom insects which play an important part in the distribution of pollen. The stamens or pollen-bearing organs, fifteen to twenty in number, are arranged next in order on the top of the closed receptacle. In the centre are found the pistils or carpels, five in number and corresponding to the five divisions in the core of an apple. An elementary knowledge of the parts

of the blossom is essential to the intelligent application of the best practices in orcharding.

To return again to our records, observations covering a great many points from Prince Edward Island to British Columbia were made. These are in no slight degree interesting, merely from the standpoint of statistical record, showing as they do the great climatic variation discovered in travelling from west to east. If it is imperative to the fullest success that varieties should be intermingled, then we should know the most suitable varieties to plant adjacent to each other, and this we can only ascertain by accurate observations extending over several seasons. These records also impress us with a fuller knowledge of the climatic variation found in the comparatively limited area of the fruit belt of Ontario. We find that Red Astrachan came into bloom at Windsor on May 3rd, South Niagara on the 8th, Burlington on May 10th, Lindsay on the 12th, and Ottawa on the 15th May. Northern Spy opened its flowers at Windsor on May 8th, South Niagara on May 10th, Burlington on May 20th, Lindsay on 16th and Ottawa on the 24th, being a difference of twelve days in one case and sixteen in the other. These two varieties also illustrate the comparatively wide differences in the habits of trees with regard to their blossoming periods. The difference would be much more strongly marked did Red Astrachan bloom with the earliest of its class. As a preliminary result of these investigations the following groups may be arranged according to the dates on which they were in full bloom :

- 1.—Earliest Group—Duchess, Fameuse, McIntosh Red, Ben Davis.
- 2.—Middle Group } Baldwin, Golden Russet, Wealthy, Wagener, Yellow Trans-
parent and Astrachan.
- 3.—Last Group } Alexander, Maiden's Blush, Northern Spy, Ribston Pippin,
Roxborough Russet, Talman Sweet.

The pears easily fall into two groups as recorded the past season. It is probable that during the normal season the blossoming period of some will be much longer and probably considerably modified in many cases. They stand this year as follows :

- 1.—First Group—Howell, Keifer, Seckel, Sheldon, Anjou.
- 2.—Second Group—Bartlett, Olapp, Duchess, Flemish Beauty.

PLUMS.

- 1.—First Group—Burbank, Duane's Purple, Lombard, Bradshaw.
- 2.—Second Group—German Prune, Imperial Gage, Moore's Arctic, Reine Claude.

CHERRIES.

In Ontario there was practically no difference in the blossoming period of different varieties last season.

These notes are offered only in a suggestive way to horticultural observers who may be and I may say should be interested in this subject. Success will come to the fruit grower of the present and of the future very much in the proportion in which hard thinking enters into the details of horticultural operations. Allow me to submit this subject as one of the details which will bear some thinking and upon which I make bold to ask the co-operation of my friends, the practical fruit growers of Ontario.

Mr. J. B. HALL, of Woodstock : Is there any way in which we can assist in fertilizing the various kinds of fruit—whether we can do it by insects or otherwise? If by insects, what is the most useful and least expensive and troublesome?

Prof. CRAIG : The paper I have just presented is an endeavor to get over some difficulties in that way. By intermingling the varieties which blossom about the same time nature will do the work, but to those of us who have orchards or blocks of single varieties and do not find them profitable I would advise the keeping of bees or the top-grafting of certain varieties with others which bloom at the same time.

Mr. BEADLE : Advise both keeping bees and grafting too, otherwise they may not get the pollen.

Mr. HALL : Are the bees a blessing or a curse ?

Prof. CRAIG : I am sorry we have not that eminent defender of bees, Mr. Holtermann, here, who conducts the department in the *Horticulturist*. I think he could defend the bee much more ably than I can, but I have not one iota of hesitation in saying that the bee is a great blessing to the fruit grower. (Hear, hear.)

Mr. RACE : It depends somewhat on the end you are fooling with. (Laughter.)

Prof. CRAIG : I have even known cases when men fooled with the business end of a bee that it proved a blessing. (Laughter.) I know that there have been statements made to the effect that bees injure grapes, but I don't think they are well founded. I think in every case that has been investigated it was found that the grapes had already burst, and the bees simply visited the grapes to extract some grape sugar and grape juice ; they are not provided with the kind of weapons to break the skins.

Mr. GEORGE BLAKE : What benefit to the fruit growers is this cross-fertilization ? Would it be a benefit to the apple grown from this blossom, or would you get the benefit from the offspring raised from the seed ?

Prof. CRAIG : Well fertilized apple blossoms mean usually well developed apples. In case the fruit did not set of itself this year, then you would get the benefit this year, but where your apples fruit freely then there is no necessity for further fertilization. I may say that no actual change takes place in the product of this year—that is, the fruit is not modified to any extent by the pollen which may be carried from another tree.

Mr. BLAKE : It seems to me this is splitting hairs. It does not benefit us fruit growers. Now the practical benefits to fruit men I want to see brought out clearly. In raising fruit we have got to go back to the grafting system ; we cannot depend on that fertilized offspring, and we lose the benefit of this cross-fertilization.

Prof. CRAIG : No, sir ; allow me to explain. If you want to get a new variety it must be done through cross-fertilization ; if you want to multiply that variety it is done through grafting or budding.

Mr. BLAKE : As practical fruit raisers we do not want to raise new varieties ; we want to get the benefit of cross-fertilization in the present crop of apples. Does it do us any good ?

Prof. CRAIG : Certainly, in a case where a variety has not sufficient pollen.

Mr. BLAKE : Our orchards are deteriorating and our fruits are not what they used to be, so if we can benefit the present generation I shall be glad. I have been in the fruit business for years. I have made a great many mistakes. If I had had the experience I have to-day I might have been thousands of dollars in pocket. My first mistake was to go into too many varieties. I have been grafting and budding and experimenting all my life. If I had just gone into two or three main varieties I would have been very successful, but I have not made it a very paying business.

The SECRETARY : Have you not some varieties that do not bear very well ?

Mr. BLAKE : Yes.

The SECRETARY : Mr. Craig has explained that if you want them to bear you should plant some other variety near them.

Mr. BLAKE : If I had gone into Kings and Baldwins thirty years ago I would have been independent to-day.

Mr. SHORT (Calgary) : I would like to ask Prof. Craig if he has run across any varieties of apples, pear, plum or cherry that we will grow in Southern Alberta, south of Calgary, in a dry section where we have to irrigate.

Prof. CRAIG : We have had no success in any portion of the North-West Territories in growing apples. I have had one specimen sent from Prince Albert last year—a specimen of Whitney Crab—which in that section was considered a great curiosity. I know

Prince Albert is a much more favorable locality than further south, as far as our experience with forestry goes to show ; but I do not think that we can hope with our present list of apples to have any of them succeed in that climate. We have been sending out seed of the hardy varieties of Russian apples and grapes to settlers asking them to plant the seed and allow the tree to remain where the seed was planted. Perhaps we may get fruit in this way, and I have advised them to go on planting seed until we find something sufficiently hardy to stand the climate.

Mr. SHORT : What do you find the difficulty ? Is it the Chinook winds ?

Prof. CRAIG : The trees have not the ability to stand the cold.

Mr. SHORT : I have planted trees. They would do all right the first season, but in the next June or July they would die. They would leaf in the spring.

Prof. CRAIG : They had been root-killed.

Mr. RACE : This gentleman (Mr. Blake) says that he has had an orchard of Kings that he has made fruitful.

Mr. BLAKE : It is a very high locality, and they have been very average bearers every year. I have planted them mixed with Baldwins. I do not know whether that has produced an effect, because I have not planted them separately to see.

The SECRETARY : What are they grafted on ?

Mr. BLAKE : On the natural fruit stock, mostly top-grafted.

Mr. RACE : And they bear every year ?

Mr. BLAKE : Bear every year, and very fine, smooth apples, too.

Prof. CRAIG : Did they begin to bear young ?

Mr. BLAKE : Yes ; my oldest tree has been bearing for thirty years, and bears healthy fine apples now.

Mr. PEART, of Burlington : It seems to be established beyond dispute that there are some varieties of strawberries that are sterile, and at Orillia last year the Brighton and Lindley grape and Bartlett pear were stated to be sterile. Have there been any experiments to show that any variety of apples is absolutely sterile ?

Prof. CRAIG : I have been carrying on some work for two years on that line. It is a very simple investigation. You simply have to cover the blossom of the apple with a paper sack to exclude all outside pollen. At the farm at Ottawa we have not yet in bearing a number of commercial varieties which I would like to report on, such as the Baldwin, the King, the Spy, and apples of that class. I have got results of a great many hardier kinds like Yellow Transparent and a number of Russians, but have not got results sufficiently definite to warrant me in giving them to the public yet. The experiments will be carried on and the results published as soon as possible.

Mr. BEADLE : Mr. Waite sent me a paper some two or three years ago in which he set forth some investigation he had made, and he had come to the conclusion that the Northern Spy was self-sterile ; that if you plant a large block of Northern Spys together you would get no fruit. I remember at our convention at Hamilton Mr. Rice told us about an orchard that had been barren of fruit for twenty-eight years, and he was besieged with questions. I remember asking him if he had Northern Spys anywhere else than in that block. He said yes, he had a few in an orchard near his house mixed with other trees, and I asked the question if they bore there. He answered that they bore very well there. Then I made the remark that botanists knew very well that there were certain varieties of fruit that were self-sterile. I remember some shrubs that grew in my own grounds that were self-sterile, but when I got other shrubs of the same variety planted near they bore seed rapidly. Now, I do not know whether this Northern Spy is self-sterile or not, but possibly this may be a solution of Mr. Rice's trouble. I sent a copy of Mr. Waite's paper to the Secretary, who published it in the *Horticulturist*. I was in hopes that it would fall into Mr. Rice's hands, and perhaps set him to try the experiment of grafting some of his Northern Spys with some other variety and see if it would have any effect upon his orchard.

Mr. TURNER: I think the orchard referred to in Hamilton belonged to Mr. Fisher, of Burlington, and he is here to-day.

Mr. FISHER: I have nothing more to say about that orchard. It continues to disappoint me every year. I would like to ask Mr. Craig if in the course of his experiments he is prepared to recommend a variety for each group—a variety strong in pollen that would be suitable for fertilizing each group that he has made according to the time of blossoming.

Mr. CRAIG: Mr. Fisher's question opens up another avenue. He says, "A variety strong in pollen." That means a variety with pollen of more than ordinary vitality. I do not know that.

Mr. CASTON: Or abundance of it.

Prof. CRAIG: It is not always the abundance of it; it is the character of the pollen itself, and that can only be found out by testing the germinating power of pollen just as you test the germinating power of seed. I cannot tell you whether the pollen of one variety is more vital than that of another.

Mr. FISHER: It is the fertilizing power we are after.

Prof. CRAIG: Well, that lies in the vitality.

Mr. BOULTER: I have 400 Golden Russets in one block and I have never had a crop of apples on them yet, and they have been thoroughly cultivated. They are all Golden Russets with the exception of two or three Ben Davis that were bought from an American for Golden Russets. (Laughter.) Wherever those Ben Davis' are they are bearing, and a little radius around of the Golden Russets have had apples on. I have 200 more Golden Russets, and the first thousand trees I put cut, that have a row of Northern Spys and Maiden's Blush put right through them, and there I had some Golden Russets this fall, and that is all I had. On the other side of the orchard there are 300 Northern Spys in a solid body. Mr. Caston has been recommending top grafting, and I think I will take chances on that and top graft some of those Golden Russets. It is possible that the Russets having no other variety among them may be the cause of their not producing as well as they should. I never thought of that till to-day.

Mr. HALL: I think if you got two or three bees in your orchard they would carry your fertilizing element, although I don't suppose you would then get any honey for your table.

Mr. CASTON: There are some seasons when the bees don't get a chance to work.

Mr. HALL: Then you don't get any fruit.

Mr. CASTON: No. I am never so well pleased as when I see the bees busy. Last spring we had an extraordinary spectacle, the trees being white with blossom and white with snow at the same time, and the bees had no chance to work. The next farm to mine had an orchard that did well because the bees worked there when they could not work in mine. I attributed the difference largely to that fact. I was asked if there was any apple that would fertilize the Spy. I think this one shown here is suitable. It is known in our district as the Red Pound; the Fruit Growers' Association named it the La Rue, and it is known in some sections as the Baxter. It originated down near Brockville, I think, on the St. Lawrence. I would recommend any one who is trying the experiment of grafting their Northern Spys to try the Baxter. It is a free grower.

Mr. SHERRINGTON, Walkerton: I am in favor of bees as a fertilizing power in orchards. In a village in our vicinity an old Scotchman who had a considerable plum orchard, said to a large bee-keeper one day when the weather was very still and damp and the bees were not flying, "Are your bees flying to-day?" The bee-keeper replied "No, it is too cold, damp, wet." "Well," said the Scotchman, "my plum trees are all out in bloom, and I can have no plums this year." Neither had he. Another man had another orchard of plums that were in full bloom a little time before or after this incident. The weather was fine and the bees were flying in the orchard thick. The man had fires all over the orchard smoking the bees away. He said, "You must take these

bees out or I will not have any plums;" but the bees did not care for the smoking and kept on with their work, and that man had a large crop of plums. If there had been winds to carry the pollen from one bloom to the other the Scotchman would have got plums, and so would the second man without the bees, probably; but the bees were the main means of bringing the crop of plums to that man's orchard.

Mr. BOULTER: Don't you think the smoke drove the curculio out of the plums?

Mr. SHERRINGTON: The curculio comes after the plum. I have a large orchard with Spys in a block, and I have noticed times that they did not bear; still I think they are not so far away but what they can be cross-fertilized with the other varieties, and I think it is very wise in planting to intersperse different varieties in the orchard.

You are all aware that there are varieties that will not self fertilize, and I think it is a very important point in planting to mix the varieties; but care should be taken that the soil is suitable for the different varieties. I have found on certain soils the Baldwin does well and on others it does not do anything. When the soil suits, the Baldwin is a good variety to plant with the Spys.

Mr. BOULTER: What is the best soil for Baldwins?

Mr. SHERRINGTON: In our localities the best is a light soil—a sandy loam. On the clays they don't do so well. I would certainly put bees in any orchard that has not got them. I would never think of trying to grow fruit without bees.

Prof. CRAIG: We should not go so far the other way as to think that all fruit tree blossoms are unable to fertilize themselves; in other words are self sterile. The majority are, and I was speaking of the exceptions. Most of the European plums are able to fertilize themselves, the blossoms being self-fertile, so that if they don't bear fruit it may be on account of some climatic influence—very great heat or sudden and prolonged heavy rains I think would wash away pollen so as to injure fertilization.

Mr. HALL: The professor has forgotten that he told us a few moments ago that it is important to have a foreigner to marry with this lassie bloom—that cross-fertilization is what was wanted to make a good offspring.

Prof. CRAIG: But you must remember that there are different sections of this subject. I was speaking of producing new varieties. I told Mr. Blake that the pollen of another variety had no influence on the fruit of this year, but if he wanted to produce a new variety he must cross it.

Mr. HALL: The strengthening quality of the apple, for instance?

Prof. CRAIG: That is what I say. Ordinarily it has no effect on the fruit of this year in changing its appearance other than helping development generally.

Mr. HALL: Does not it make it better in quality, larger in size, better in shape?

Prof. CRAIG: I don't think it will affect the quality or shape, but may improve the size.

Mr. SHERRINGTON: In one of our orchards a very close observer found growing on a Rhode Island Greening a perfect Golden Russet. All the difference was that just around the stem you would see the Greening, but the rest was a perfect russet. In the spring he cut the apple, but there was not a perfect seed in it. What was the cause?

Mr. BLAKE: I would like to ask, if the fertilizing fruit does not affect the present year's fruit, why do we plant strawberries of different sexes to fertilize the blossoms, to have the fruit of the present year?

Prof. CRAIG: To get fruit. In one case you don't get fruit, and in the other case you do get fruit. There are exceptions which nobody can explain. In all the animal kingdom we have what we call "sports." I had two specimens of apples sent into me this year each of which exhibited two varieties. One was a Golden Russet on one side as perfect as could be, and the other half was Ben Davis; and the line of demarcation was just as clear cut as if it had been painted by hand. I don't think this was the effect of cross-fertilization; it was probably a "sport."

The PRESIDENT: What was the flavor?

Prof. CRAIG: The flavor was Golden Russet throughout. It grew on a Golden Russet tree. I had another specimen of the same kind from Nova Scotia. These I only regard as "sports," and I don't know of any way of accounting for them.

Mr. SHERRINGTON: I have frequently met with raspberries where one-half would be red and the other half yellow. Is not that accounted for by the fertilizing of the fruit in its blossom?

Prof. CRAIG: I don't think so, because you can't get that constant effect every time. I have crossed hundreds of blossoms of strawberries and apples without that result.

Mr. WATKINS (Michigan): In my immediate vicinity there is a large tract of country about twenty miles long and two or three miles wide, called the Burr Oak Plains, very fertile farm land, and most excellent fruit land for about twenty years. All of a sudden that land, planted to orchards, began to dwindle, and after twenty-five years there has not been a bushel of apples taken out of the entire tract. We have such tracts all over the state. Every device that we could conceive of has been tried to produce fruit on this ground—frequently farm lands bearing heavy crops—a clay shale with a great deal of lime and plenty of potash, and supposed to be excellent fruit land. Now, if the pollenizing is perfect, what is the reason of all kinds of varieties failing on that land? Right by the side of that land there is a rise of broken land with a heavy clay loam bearing fruit perfectly to this day. You can almost throw a stone from one to the other along its whole line. It seems to me that sterilizes the whole matter of pollenization.

Mr. BEADLE: Do those orchards blossom well?

Mr. WATKINS: Perfectly, and perfectly thrifty trees, but no fruit.

Mr. BOULTER: And plenty of bees?

Mr. WATKINS: Yes, sir.

Mr. RICE (Michigan): I don't want you to learn any wrong lessons from my orchard, and if you can learn any good lessons from it, and get any good out of it, you will do better than I can. I will make you a little statement in regard to it. My orchard is situated in Wayne county, New York, the banner county for apples in the world. (Hear, hear.) If the evaporated fruit from that vicinity could be made up into apple pies they would reach continuously around the world. (Laughter.) My orchard stands on a hill, which is mostly heavy clay loam. As you stand on that hill in spring time and look along up the ridge road to the west and off towards the lake and see the orchards in bloom in every direction, you will see that you are in the midst of a garden of orchards, and they are all productive. I was always quite a theorist, and about thirty years ago people said that nurserymen were ruining their stock by continually cutting their grafts from nursery rows; and I said I will not ruin my orchards. I sent to Rochester for the trees. I said I cared nothing for the varieties, I was going to top-graft my trees from the very best stock to be obtained from the whole country; and I got good, nice stock, and I think that they stated that they were mostly Alexander apples, but there were some Northern Spies in the stock. After planting I had an expert go right through and top-graft. In cutting the scions I went to my father's orchard twenty rods away down on the ridge road—just down hill, as you might say—and I cut from Baldwin trees that were planted fifty years ago, trees bought from Maxwell Bros., of Geneva, and which, from the time they were large enough to bear, had never and have never really failed a crop. I cut, not from water-sprouts, not from lower limbs, but from the top limbs of the tree, so as to be sure to get the place where the wood was best developed and the buds best developed and in the best order. I did the same with my Greenings, and we went through and grafted. The stock took remarkably well, and the trees thrive and grew, and I thought of the happy days I was going to have selling the fruit and living at ease. I waited for those days, and they didn't come. I went off to Michigan, where I had a piece of wild land, and I have been strug-

gling along there, occasionally going down to look at my orchard. I have not been there for four years. I don't care much about seeing it. One year the Greening trees bore \$500 worth of fruit. I got half of it. The Baldwins have never borne a crop. The orchard extends in such a manner that the corners are on the south of the orchard, the furthest from the crown of the hill, and there are the longest rows in the orchard, the hill being narrower in the west end and wider in the east end. There are four rows of Greenings on the south of the line the entire length, and then come in the Baldwins. A few Golden Russets were planted about half way among the Baldwins. Two or three Red Astrachans were planted, and one or two earlier apples, and so on through—they were scattered through the orchard. Now, we have tried to get a crop of fruit, and we did not do it, and we can't tell why. The orchard blossoms, yet the trees don't produce. That orchard over the fence that I used to go and steal apples out of when I was a little boy is still there and bearing in a very nice way.

PEAR GROWING FOR PROFIT.

Mr. E. E. BEMAN, of Newcastle, read the following paper :

In preparing this paper, I have endeavored to give a few practical details, necessary to observe in making a successful business of pear growing, gained from experience in a fairly successful pursuit of pear growing for market for some twenty years, with an orchard of about two thousand trees. I will be as brief as possible, giving mainly practical pointers and leaving the theoretical part of the subject to others who may have more time to spend in that line.

The first thing to be taken into consideration is the soil and situation, for if that is not right, the whole business will only result in failure. I do not think there is much use to attempt growing pears any great distance from the ameliorating influence of the great bodies of waters with which our province is so abundantly supplied. The best soil I believe to be composed of a good, rich clay loam surface soil, with a deep alluvial clay subsoil. The pear being a deep-rooted tree, requires a soil in which the roots can extend downwards without obstruction, so as to obtain a plentiful supply of moisture, but the subsoil must not be springy, nor too retentive of water, unless it can be easily under-drained. The worst soil, in my opinion, is a cold, wet, quicksand subsoil.

In preparing the soil for planting, I would work it in about the same manner that I would if I intended to grow a first-class crop of grain by manuring, plowing, clearing from weeds and getting it in good condition for spring planting.

In planting an orchard for profit I would select standard trees. Dwarf trees may possibly succeed with a great deal of petting and pampering, but I have had no success with them in my own orchard. Select good, thrifty, but not too rapidly grown trees, not more than two years old. I would much rather have good one-year-old trees than three years old at the same price. As to what varieties to plant, this is a difficult question to answer. A variety that will succeed well in one locality may not do so a few miles away, or even on an adjoining farm if the soil is different. The surest way is to find out what varieties succeed in your own locality and on a similar soil. You also want to take into consideration the market you send your fruit to and what varieties sell at best prices. I would not advise planting too many varieties unless you are like myself, fond of experimenting and willing to lose money in doing so. Of course you can top-graft any that do not prove satisfactory when they come into bearing. As a rule I do not think the very early varieties are profitable. The principal varieties that I grow in my own orchard are the following: Bartlett and Clapp's Favorite. Duchesse Precoce ripens a few days later than Bartlett, resembles it in appearance, not quite so good for dessert, but very fine for canning, an exceedingly productive and profitable variety. Wilmot, a local seedling, not quite large enough, but very hardy, healthy, productive, of good quality when well grown and a good shipper, ripening from ten days to two weeks later than Bartlett, usually sells at fair prices. I also grow the following in smaller proportion: Anjou, Winter Nelis, Sheldon, Beurre Bose, Boussock, Goodale Howell, Mount Vernon and about one hundred and fifty other varieties, new and old, for the purpose of testing them.

There is one thing I want particularly to call your attention to and that is the distance apart to plant the trees. They are generally planted too close. I made that mistake in planting my own orchard, and now have to suffer the inconvenience of their being too close together to conveniently drive between the rows for the purpose of spraying and drawing out the fruit. Mark out the rows twenty-five feet apart, the rows running north and south if possible to allow each side to get the benefit of the sun. They can be planted a little closer in the rows, say about twenty feet. Prepare the trees by cutting off any broken roots and cutting back the last year's growth from one-half to three-fourths to balance the loss of the roots. Plant as early in the spring as the ground can be got in good condition, that is, when the earth is comparatively dry and friable.

Your orchard is now started, but do not think the work is quite finished, it has only commenced. On your careful attention to it now depends the pleasure and the profit to be derived from it in the future. Give it careful cultivation. You can grow any kind of hoe crop to make it pay expenses, but do not grow any kind of grain crop, as by so doing you will seriously injure the trees. Put on sufficient manure to keep up a good healthy growth of wood. They will require special attention to trimming while young. The natural form of growth of the pear is the pyramidal, and it is best to train them in that form by giving careful annual attention in the latter part of winter and early spring, cutting back shoots that may have grown too strong, thinning out superfluous ones and occasionally pinching back some of the strongest in summer. You can get a well formed pyramidal top, with about three branches in each tier and each tier about eighteen inches to two feet apart, always watching that the lower branches have the advantage by keeping the top ones cut back or pinching back in summer. After the trees get well into bearing they will not require much trimming, only occasionally cutting out any interlacing branches and dead wood. I am now coming to a point in the management of a pear orchard in which many of you will disagree with me. We will suppose the trees have attained a good size, some commencing to bear freely. I would now seed down to clover and endeavor as much as possible to keep it into clover by annually sowing a few pounds of seed late in the winter, just as the snow is nearly all gone. Then when you have a very fine crop of grass don't get too greedy and try to take two crops from your land—a heavy crop of hay and a fine crop of pears. Be satisfied with the pear crop alone. Cut your clover about the same time it blossoms out and let it remain on the ground to rot and you will have a splendid mulch; keeping the sod comparatively open and the soil moist. The decayed clover will give you the nitrogen and humus necessary to keep the soil in good condition. Then before your pears are ripe cut the clover again and leave it also on the ground, never removing any of the hay, and you will have a nice clean orchard to work in with a good soft cushion for any pears that may be blown off. I cannot say that this method will answer equally as well in all soils, but I know from practical experience that it is a success in my own orchard. I have about two acres that has been seeded to grass about ten years, and it is the part of the orchard that has the best and largest trees, has had the least loss from blight and has produced the most and best fruit. One special reason I have for advocating growing in grass is the greatly diminished liability to blight, which is undoubtedly the greatest drawback to success in pear growing. In the part seeded to grass I have had very little loss from blight, while the cultivated part has suffered severely. I have it nearly all seeded down at present.

In regard to manures, I am inclined to think that the pear requires heavier manuring than the apple. I would use freely of stable manure, but not enough to produce too rank growth. As the ashes of both wood and fruit contain large quantities of potash and phosphates, I would apply plenty of unleached ashes if easily obtained; or if difficult to get, would use muriate of potash, to give the potash and bone dust to supply the phosphates. I will not in this paper say much about picking, packing and marketing. Pick most of pears before fully ripe, especially the earlier varieties. A very good way to tell when to pick is to gently raise the pear, and if it parts freely from the branch it is ready to pick. Handle carefully all through. Use the cleanest and neatest package you can get, whether barrels or baskets. Never use old dirty barrels to save a few cents. Pack under cover to keep all clean, and pack honestly, keeping out all wormy and poor fruit. You can

feed them to the hogs or sell them at home as culls. Then you will not be ashamed to put your name on your packages. Have them as good in the bottom of the barrel or basket as on top, and in time you will become known as an honest grower and packer, and you will get much better prices than you would by putting a few poor ones into the packages and spoiling the whole sample. In marketing, if you send to a commission merchant try to pick on an honest and reliable man, and send all your fruit to him rather than sending to several men in the same city. As a rule you will get better prices by so doing, as your name will become known to his customers and they will take your fruit in preference to other brands not known to them

Regarding the profits of pear culture, I think it pays as well and perhaps better than most branches of fruit culture in this province, providing all the conditions of soil and locality are right ; but if they are not you will find the business very unsatisfactory. Not that I would discourage anyone from planting, but merely advising the same caution you would exercise in commencing any other business pursuit. If you know by other trees growing on your own land or in your immediate vicinity and on similar soil that they succeed, you will be safe to plant. Otherwise I would advise planting a few at first until you ascertain the adaptability of your soil to their growth.

The SECRETARY : I visited Mr. Beman's orchard this summer, and can vouch for the truth of what he has stated—the thrift of his trees and the excellence of his orchard—in every particular, and the excellence of the fruit that he grows under the methods that he has discussed. His orchard is beautifully situated on the north shore of Lake Ontario at Newcastle. His packages stand high in the Montreal market as those of an honest packer, and he is getting the benefit of that reputation. I think it would be interesting for us to know how he packs the fruit, the packages he uses and so on.

Mr. BEMAN : I have sent to Montreal market, which I find generally better than the Toronto market. I find that barrels pay better than baskets, taking into consideration the price of the barrels and the putting in the fruit. As a rule I put all my best pears in barrels. Possibly the Montreal market required a little different plan of packing, but I have been informed by the commission men there that they send a great deal of fruit out to other points, and they want it picked a little on the green side, and they rather have it in barrels. As for baskets, I packed quite a few, and they are sold in Montreal. This year I sent quite a few baskets to Toronto, and they did better than what I sent to Montreal. I always pack under cover ; it keeps the fruit and the barrels and everything else cleaner. I very often in the barrels make two samples. Very often if I have very fine grown ones I will make two or three or four barrels of the very best that I have and mark them as "Extra choice selected," or something in that way. The second quality would of course be of first-class fruit, even in size, but not large. I think by keeping the large ones out and putting them in a separate barrel you would really get a better price for the mediums than if you put the extra large ones in. Then I have a third class occasionally with some varieties, and I send them to market and advise the commission men what the quality is and sell them on their market. I put in them nothing but sound, nice fruit in every respect, though not so large. If I can sell the culls at home, well and good ; if not, I feed them out. Hogs will eat them, and it is better to do that than lose money by sending them away.

Mr. RACE : Do you pasture sheep or hogs on the orchard ?

Mr. BEMAN : I never pasture sheep or hogs at all. My soil is very deep. The sub-soil would be a good alluvial clay running down some places possibly eight or ten feet before you come to any stone at all, and of course there is any amount of moisture down there, and I don't find any difficulty from grass drying out ; in fact I cut the grass down and it lies there, and at any time in the summer you may lift the grass up and find the ground all moist often in the driest seasons. The grass perhaps does abstract considerable moisture, but if the land is bare it will abstract it. I would be inclined to deal with apples in the same way as I have pears.

Mr. BEADLE: You have not been troubled with field mice?

Mr. BEMAN: No; I keep a good many cats, and they keep the mice down.

Mr. RICE: How do you protect the birds if you keep cats?

Mr. BEMAN: They have to stand the chances.

Mr. BOULTER: I understand you to say you put the trees about twenty or twenty-five feet apart.

Mr. BEMAN: I put mine sixteen feet apart, but if I were planting again I would not put them closer than twenty-five feet. In the oldest part of my orchards the trees have been planted twenty-one or twenty-two years, and the branches are so low now that I can scarcely drive through in spraying them.

Mr. BOULTER: As I am a large buyer of pears I was particularly pleased about that point in packing. I will hunt you up next summer.

Mr. FISHER (Burlington): Have you never had trouble from mice?

Mr. BEMAN: Not for ten or fifteen years.

Mr. FISHER: How long have you been pursuing this practice?

Mr. BEMAN: I have had one part seeded down now about ten years without having plowed up.

Mr. FISHER: The trees were large trees when you commenced this practice?

Mr. BEMAN: Yes.

Mr. FISHER: You would not dare to do this among small trees?

Mr. BEMAN: Oh, certainly not. I would keep it cultivated till the trees commenced to bear, or till the trees get a good size—for probably eight or nine years.

Mr. BOULTER: Don't you tread the first snow that comes in the fall around your trees?

Mr. BEMAN: No.

Mr. FISHER: That would be an awful task.

Mr. BEMAN: I have two thousand trees. You can tramp a great deal in a day, but I have never done it. One year I did lose quite a number of trees.

Mr. FISHER: The greatest disappointment that I have had in growing fruit trees was from field mice. I have endeavored to keep the orchards perfectly clean, but that doesn't keep the mice out. I find tracks of mice every spring all through my orchards that have been plowed and cleaned all through the season. They go through the orchards every winter in spite of the cultivating, and orchards that have been cultivated regularly are just the same as those that have not been cultivated. You say your experience with dwarf pears has not been satisfactory?

Mr. BEMAN: Not at all, I have not had any dwarfs now for about ten or fifteen years. I planted about forty trees altogether, a number of varieties, and they gradually disappeared and I have not one left.

Mr. FISHER: My experience with the Dwarf Duchess has been eminently successful. I have a large number of trees, and they have borne well and paid me well. The fruit sells well and it is of a pretty good quality.

Mr. BEMAN: In my locality the Duchess is not a success at all.

Mr. BOULTER: I noticed that Mr. Beman eliminated the Flemish Beauty entirely from his list.

Mr. BEMAN: I was so well pleased with the Flemish Beauty when I started that I planted 1,200 trees; but when they commenced to scab I top-grafted the whole lot except a few large ones. There is one point perhaps I should mention, and that is, for instance, the Bartlett, which is not a high growing tree. I have found as a rule it is rather strong and begins bearing very early. There is one variety I intend to plant ten

acres of—that is the Tyson, which is one of the hardiest growing trees. It is large and strong, and grows in pyramidal form. When they get large enough, in say two or three years' growth, having formed a nice top, then I would top-graft them to any other varieties that I think suitable. But the Tyson is not a success as a market pear, in some sections being rather small.

Prof. CRAIG: Would you top-graft on the main branches?

Mr. BEMAN: I would top-graft as far out as I possibly could. I don't top-graft any branches more than from a quarter of an inch to an inch stock. Of course this involves a great deal more labor in top-grafting, but I lose less time and have a better crop.

Prof. CRAIG: Have you tried the Keifer?

Mr. BEMAN: I have tried the Keifer. It grows well for a time and after that it becomes unhealthy. I planted three or four trees and lost all of them.

Mr. DEMPSEY: Does the Keifer grow large with you?

Mr. BEMAN: No.

Mr. MORDEN: The Keifer in Southern Ontario and Western Niagara would be a success on light soils, and will grow a fruit that not a half a dozen men in this room would stick up their nose at; but grown further north in Ontario or on soils more clayey, the quality I think would be rather doubtful, but at Niagara Falls we can get a magnificent crop of very nice fruit every year, and it only failed this year from that late frost.

Mr. BEMAN: I am trying a somewhat similar one, the Garber, a seedling from some of the Japanese varieties of pears, and I find it grows and succeeds a little better than the Keifer, but I think it is scarcely a good pear for canning. It has not been satisfactory to me, only it is a very fine grower, and it might make a very fine stock; I cannot tell yet.

Mr. MORDEN: Keep your Keifers on the trees as long as you can.

Mr. BEMAN: That is what I do. I keep them on the same as I would any winter pear.

Mr. BOULTER: Have you found the Sheldon a good pear?

Mr. BEMAN: It is not a perfectly hardy pear, and with me it has blown off very badly; otherwise it was a fine market pear.

Mr. BOULTER: The Bartlett is rather delicate.

Mr. BEMAN: I think it is better to graft it on another variety. I have top-grafted 150 Flemish Beauties into Bartletts, and they are much larger than the trees that we originally planted as Bartletts; so I think that if I wanted to grow Bartletts I would do better by growing them on a hardy healthy stock off larger trees, and produce better fruit.

Mr. BOULTER: I put out 500 pear trees in 1879. In 1884 and 1885 I lost every Bartlett, every Sheldon, Osband's Summer, and Beurre d'Anjou; and all I had left was Clapp's Favorite and Flemish Beautys. The rest were winter killed. I am very anxious to grow Bartletts, as we use an immense quantity of them for canning, and we are now top-grafting all our Flemish Beautys with Bartletts. I have great hopes of the Sheldon pear.

Mr. ORR: I have planted pears on virgin soil that has never been cultivated, and that has been in sod since they were four years old. I cultivated them up to that date to give them growth, and I have them that have been cultivated regularly, and the blight has affected them equally; I see no difference whatever. I have never lost a tree of Sheldons; they are bearing splendidly, but as stated, they are apt to drop off. Every tree of my Clapp's Favorite is gone. I think the mouse question can be easily settled. We want one more association—the No-Fence Association. (Hear, hear). Twelve years ago in our section we determined to have no fences and we had a great fight with the

neighbors and with the municipal council, but we prevailed, and we took down our fences. The fences and the old ditches are the harbor for mice. We put tiles into the old draining ditches and closed them up. We had no fences between our neighbors, no fences on the road, and we have no mice.

A DELEGATE : Where do you live ?

Mr. ORR : Fruitland, nine miles from Hamilton.

Mr. FISHER : I would like to ask Mr. Beman if in his experience in grafting large trees he has found the growth of top-grafted pear trees any more subject to blight than that of a tree that has grown up from the roots.

Mr. BEMAN : No, I have not ; in fact I never noticed any difference.

Mr. FISHER : We had trees where the fruit was no good, and we top-grafted them, and for several years I raised Bartletts of superior quality on these grafts, but they have been blighted terribly ; a top-grafted pear tree is more liable to blight.

Mr. BEMAN : In those two acres I spoke of there are about 150 in that block of Bartletts top-grafted on the Flemish Beautys, and I don't think I have lost more than one or two ; in fact in the whole 300 I think I have only lost three or four trees.

Prof. CRAIG : Some three years ago I attempted to get some information with regard to the prevalence of blight in orchards cultivated in different ways, and to investigate the subject generally. I sent out a number of circulars to as many pear growers as I could find over the provinces of Ontario, Quebec and Nova Scotia, and asked a number of questions, and in duplicating the results I found about 65 per cent. of replies were in favor of growing pears in sod with a view to immunity from blight, and these replies were based on their experiences in that method of cultivation, and it was quite in line with what Mr. Beman said, though I think with Mr. Orr that you find exceptions, that it is impossible to account for. But I think in the majority of cases after pear trees come into bearing they are less liable to be affected with blight if grown in sod. Experiments have shown that the bacteria or germ which causes pear blight grows much more rapidly in a variety which has a superabundance of juice, and any variety when growing rapidly has much more juice in its tissues than when growing slowly. Arguing along that line, it is more reasonable to suppose that a variety growing rapidly would have more juice in its tissues and would be more likely to be blighted than otherwise. So I think Mr. Beman's method would be the right one in the majority of cases, and would hold true.

Mr. BEMAN : I have seeded down two acres, and was so well satisfied that I seeded the rest of the orchard last spring, but some of it had got a little dirty and I wanted to have it in a nice condition ; in fact, I have been growing strawberries, which is not a very nice crop to get in good condition if you allow it to go too long. While on one part I sowed buckwheat, partly to get it into good condition—I thought buckwheat was good to sow in an orchard anyway—I summer-fallowed the other part. The part I summer-fallowed blighted very badly. The blight was very bad that year ; blight seems to follow certain years. The part that was in buckwheat did not average nearly so bad. The next year I changed around again and the part that I seeded I sowed a few oats on, and the part that had been in buckwheat before, I summer-fallowed ; and the part I summer-fallowed then was worse than the other, and the part that had a little grain in I suppose kept the soil cool and it was much freer from blight than the other. Judging from that, I would say that the soil should be protected in some way, either by growing grass or buckwheat, or by mulching.

Mr. BOULTER : Have you ever tried putting ashes around the trees ?

Mr. BEMAN : Yes, and it is a great benefit.

The SECRETARY : Would Mr. Fisher tell us what packages he uses for the Duchess pear, and when he puts it on the market ? We would like to know because the Duchess has not been very profitable of late.

Mr. FISHER : I got my best prices from a full barrel of hard green fruit. I make more grades than Mr. Beman does. I always take out a fancy grade, and I consider

this fancy grade of mine away beyond No. 1. (Hear, hear). There is no place in the barrel suitable for it. If it is left with the pile we of course would put it on the face, and it does not fairly represent the contents of the barrel, so we put it in a barrel by itself. Then I make about two grades—a No. 1, according to the sizes, and a No. 2—and always keep out the soft fruit and put it in a barrel by itself. This will make five or six grades of almost any kind of pears that I handle. As to the time: last winter I had a considerable quantity of Bartlett pears kept in Montreal in cold storage till about the 1st of April, and my commission men were so disappointed at the result that they paid the cold storage themselves. I think there is no time so good for selling pears as during the season of pears.

Mr. BOULTER : When a man wants to buy them.

Mr. FISHER : People are looking for them then. They are not looking for them in the spring or any other time out of their season. If we had some means of extending the season so that we could hold our fruit for a week or two till the glut was over, it would often sell at better prices than if sent forward when we now have to send it ; but my experience with Montreal market this year was a little different from Mr. Beman's. I found Montreal market good for pears when mine were ripe. I got telegram after telegram from Montreal asking for pears, and those that I sent down there sold well at \$10 a barrel.

Mr. SMITH : Did you get \$10 a barrel for Duchess ?

Mr. FISHER : No, sir. Bartletts.

The SECRETARY : What was the date ?

Mr. FISHER : I don't remember the date ; it would be perhaps the 10th of September.

The SECRETARY : You kept them as long as you could in the orchard ?

Mr. FISHER : Yes.

Mr. MORDEN : Do you plant your dwarf trees deeply ?

Mr. FISHER. I plant them very deeply, so that the union is at least a foot below the surface, and it may be that my trees root above the union and become standard. We have trees on the farm that have been standing for forty or fifty years. With me the dwarf tree is not a temporary tree.

The SECRETARY : I have been differing from both these gentlemen in shipping Bartlett pears. I always put the finest fruit in the smallest packages instead of the biggest. Extras I put in a basket ; and I fancy I do better in that way than if I put them in barrels. With regard to extending the season of the Bartlett I have usually tried to do that, because at the height of the season they bring a very low price when the markets are full of them. So for two years past I have sent a lot of baskets of prime Bartletts, that were picked firm, to a cold storage warehouse, and paid to have them kept for two or three weeks until the glut of Bartlett pears was over. That just simply prolonged the market. By doing that I found I could get an advanced price over what I would have got had I sold them immediately. I think perhaps that is about the best way we can handle our Bartlett pears. I think Mr. Beman has the advantage over us all in that respect, as I understand he can leave his pears in his orchard unpicked, and save his cold storage altogether, until about the time when we would keep them in cold storage. His situation on the shore is such that for some reason or other I believe he is able to leave them unpicked until the season for selling.

Mr. FISHER : There is a gentleman living in Burlington who raises a considerable quantity of pears, who used boxes last year for shipping to Toronto. Each individual pear he wrapped in tissue paper by itself, and he realized about \$12 a barrel for fruit shipped in that way. The size of the box was about four to the barrel.

The SECRETARY : But the secret of the high price was the time he put them on the market more than the package, probably.

Mr. FISHER : They were put on the market at the time of ripening ; they had no cold storage.

Mr. HUGGARD: I have some sixty varieties of pears and some four or five hundred trees, and am interested in pear culture. I live near Mr. Beman, and have been watching his orchard. Our system is to grow corn the first year the young trees are set out—in other words, to cultivate the land thoroughly. In twenty years I have only lost from blight some eight or ten Flemish Beautys and one Clapp out of eight. I attribute this very largely to the extensive use of ashes. I have been asked twenty times a year how to get black knot out of cherries and plums. I replied at once, "By using plenty of ashes." I have never seen a tree where there was an abundance of ashes put round the roots that had black knot on it, that is if the ashes were put on before the tree was affected by black knot.

Mr. ORR: Is it the same with blight?

Mr. HUGGARD: My pear trees that were blighted and died got the same treatment as the other ones. In an orchard immediately below Oshawa, in a far more favorable locality than mine and equally as good land, I don't think the owner has three trees left in good condition out of 600. He didn't use ashes. I have a good word to say for the Keifer. I think I was the first man in South Ontario that had the Keifer growing. I brought it with me in a valise from Philadelphia from the Centennial, and have had them ever since. The trees never show the first sign of blight. They commenced to bear when they were three years, and some of them when they were two years planted, and they bear incessantly—(Hear, hear)—and if anyone will tell me how I can grow just half the number without spending time to take them off, I will be very grateful. On some of my trees this year I had thirteen props, on some nine, and so on. The quality of the pear depends largely on its cultivation and treatment afterwards. Situated as we are, immediately on the north shore of Lake Ontario, we often get an easterly wind and south-westerly wind that damages a large number of orchards over our section. It is largely the farmers' fault that they lose so much. The last twenty or twenty-five years I have been preaching to the people to plant evergreens, but because they get them for nothing they won't set them out. In the county of Kent we find men that will buy five or six thousand evergreens to set around their orchards for protection, and they grow thirty or forty feet high. They have larger crops than we have in Oxford or Ontario county, because the wind is a very serious thing in our apple and pear orchards. We trim our young pear trees severely the first two or three years until they commence fruiting. We cultivate the ground and keep it very rich, so that when they are about six or eight years old they are in pretty full bearing. We set them out 16x20, and so far our trees don't seem to interfere, because they bear so much fruit annually that their limbs are simply like weeping trees. A pear like the Keifer with me overbears, while we have one or two other varieties that bear too many pears. We have quite a number of Clapp's Favorite that are large, beautiful, lofty, clean trees. I would not plant another Clapp's Favorite if you were to give it to me for nothing, because with me they will not bear. I have twenty or twenty-five Beurre d'Anjou, and they have not yielded me half a dollar a tree since they were planted quite a number of years ago. On the other hand one Keifer tree realized \$11, and the Bartletts usually produce from five to eight dollars a tree where the fruit is allowed by the wind to remain till picking time. We make three grades of our fruit. If I am passing a tree any time through the summer and see a pear that is cracked or knotted I take it off the tree at once. If I see a twig or a branch that I think should be removed it comes off at the same time; and keeping an eye to business like this you soon get a neatly formed orchard without having to remove great large branches later on, which it is very injudicious to do. I find where you feed the trees and take care of them they will take care of you, without a doubt. I believe a large percentage of the blight to-day is produced by not thoroughly underdraining your soil. Mr. Beman said he would not set an orchard out in any soil if it had a swampy or leachy bottom; that is the worst kind for an orchard, but more especially for pears. I have a few Duchess trees which load every year with very fine specimens of fruit. We market our Keifers usually in barrels. I sent some thirty baskets to Montreal the other day, as they were requested instead of barrels for local use. Last year I sent them in barrels and realized a good profit. My

Keifers have paid me double any other kind of pear except the Bartletts. I think the chief trouble about pear growing in this country is that growers do not first make the land rich enough. They don't underdrain it enough, and they seed it down too soon after the young trees are planted. I don't purpose cutting out any wood till after the tree commences fruiting. I think I have a very handsome young orchard growing. With regard to cold storage, I just finished constructing one last week ; I have brought a specimen of some summer apples we have kept in it since the frost began until now.

Mr. RICE announced that the delegation from the Michigan Horticultural Society had brought copies of their annual report for 1894 for distribution, and would be glad to have the names of local societies to whom they might be sent.

PROFITS OF FRUIT GROWING.

The SECRETARY : There are one or two questions that might be taken up. One is "Should inexperienced men be advised to leave their business and engage in fruit growing for profit?" You know that very often people interested in the sale of trees are inclined to rather exaggerate the profits of fruit growing. Now, I don't think that is the wish of this Society. We want to place before the public an honest view of this business. The other day I had a visit from a gentleman who is head master of a high school at a salary of \$1,500 a year. He said he had been directed to me for advice, and wanted to know whether I thought it would be advisable for him to throw up his position and go into fruit growing. His age was about forty and he had two or three thousand dollars saved up and he was ready for hard work and thought he could do a good deal better and have a more comfortable home for his old age by going into fruit growing. I told him I would not advise him to do it and he was very much disappointed, and when he went away he thanked me for my advice, but nevertheless he said "I am inclined to go into it yet."

Mr. MORDEN : In my neighborhood of Niagara Falls I think I have seen more men fail at fruit culture after they go into it in that way than any other employment I can think of. I find our grocery keepers and our various tradesmen endure pretty well, but our fruit growers come and go, and the same is true somewhat of market gardening. There is a popular fallacy that there is a lot of money in fruit, that any man that cannot succeed in anything else can succeed in fruit growing. There is nobody knows more about farming than the man that lives in the centre of a very large city (laughter), and it is so in regard to fruit growing. I think our friends in the Grimsby district would agree in saying that there are a lot of people who rush into it and rush out of it again.

Prof. CRAIG : I would like to hear Mr. McNeill's views.

Mr. MCNEILL : I am in the position of the high school master who gave up a very good situation to go into fruit growing (laughter). I can say here that I do not regret it—(Hear, hear)—although I have been in the high school at least one month of the twelve ever since I left it, and like to get back, for no one enjoys teaching better than I do, and I had a first-rate laboratory just as I wanted it for teaching natural science ; yet, candidly, I am very glad I gave it up. I am much better physically, and I believe mentally. School teaching is usually regarded as an intellectual occupation. In most cases a man's intellect can't get to a funeral quicker than by taking up a class. He has to get out from his associations and strike out on independent lines before he can maintain his intellectual life ; that is my experience. The man who will devote himself exclusively to a school is on a fair way to intellectual decay. I would like to qualify that a little if I had time, but I cannot take time to do it. In addition to that I like to work, and I would rather to-day go out and work in a vineyard or a corn field than to be cooped up in any school-room that I know of for a whole day, and taking the whole work all the way through it is pleasant, and if any man cannot enjoy being out in the sunlight and air there is something wrong with him. (Hear, hear.) But as a money making institution fruit growing has not altogether been a success. For one or two years we made money rapidly—there

happened to be good times—but during the last two years we have had to learn some severe lessons of economy to make both ends meet, and I would not recommend it. I would say it is almost impossible for any high school teacher at the age of forty to make fruit growing a success. His physical powers are so run down that he cannot make a success of the work. At forty it is difficult for a man to get his body into position for the work—it is a dangerous experiment. If he has always been used to violent exercise it may not hurt him, but if he has always been in a school the chances are that the wrench to his physical system will be more than he can stand and his pocket will be decidedly worse. I have no hesitation in saying that ninety-nine people out of a hundred that go into fruit growing without a preliminary training on a farm from youth, or some other training in a preliminary way, will fail. I will put this as a rider. I got into it partly from the love of it and partly because I dabbled in real estate. I found a property that I thought was going to rise in value, and I thought I would not only get the increase in value, but make a profit out of it. I made it in that way, but I lost it in the actual practice of fruit growing. Notwithstanding that for a number of years I have been experimenting upon a large tract of land, yet when I got into the actual practice of fruit growing I found I had to begin almost at the bottom and learn the details all the way up. There is just as much in fruit growing as in anything else. A lady of my acquaintance, noticing the rough condition of my hands, asked me if I did not think I was wasting my life up there on the farm, at the same time complimenting me on my ability. I said “I find there is just as much opportunity for the exercise of every bit of ability that is in me as I did in the Windsor High School—(Hear, hear)—and if there is a bit of brains that is not thoroughly and systematically exercised on that farm, I would like you to find it out.” (Hear, hear.) I don't feel it in any sense derogatory to me or anybody else to go into the matter of fruit growing. I feel just as much dignity when I am drawing a load of manure to the back end of the farm as I ever did when I was before a class. At the same time there is no money in it. A man is not sure every year of making a little beyond his expenses until he serves as an apprentice. If he has served his apprenticeship on a farm and is a man of considerable brains he can make money by it. I have served my apprenticeship now, and I believe I can make money out of it. There is money in it, but not for the amateur. It is a trade, it is a profession, just as much as any other profession, and has to be learned in the same way. As a novice would fail if he went into the watch-making, so if he goes into the fruit growing business he will fail. (Hear, hear, and applause).

Mr. A. H. PETTIT : I would just like to give the audience a living example in this matter of fruit growing. Here is a gentleman who has taught a high school for a number of years, and he is here to-day as a practical fruit grower with all the energy any man might wish ; you can see that from his remarks. I visited his place and saw that everything on his farm looks prosperous and successful, so I think he stands as a successful example of a fruit grower, coming to the place where my friend Mr. Woolverton advised the other high school teacher not to go. In regard to Mr. Morden's remarks, you can't point me a man in the Niagara district that has left the profession of fruit growing and gone back to farming or any other business. If there is any one profession above another where a man can live an enjoyable life, a profitable one, a successful one, and one that he can leave and hand down to his children, it is fruit growing. That can be followed out to advantage by the man who mixes a considerable amount of brains with his work. (Hear, hear, and applause).

TOP GRAFTING ON TOLMAN SWEET.

Mr. PRESIDENT : Mr. Caston has a subject which he will introduce now.

Mr. CASTON : I think the question of top grafting on hardy varieties is one of the most important for fruit growers in this country. The King stands at the head of all apples to-day, as you will find from circulars sent from the Old Country ; and yet the trouble is that it is not a good bearer. There is more money in that apple if you could

get it to bear well than any other apple in Canada. Last year and the year before the Newton Pippin brought a higher price in United States, selling at thirty shillings a barrel, but the popular taste in the Old Country is more favorable to a colored apple. This year we find the King sells away ahead of the Newton Pippin, having been sold as high as twenty-three shillings a barrel lately, while the Newton Pippin has not brought more than eighteen or twenty. In the fall of '94 I found an orchard about five or six miles from my home on the side of a hill where an American had been around a few years before and put in a seedling, and a graft had been put in on each side of the King, and it was literally bent down in the shape of a cone loaded with the finest specimens of King apples I ever saw. It was facing the south and these grafts were growing on the old seedling. I always advocate grafting these tender varieties on a hardy stock, for you will find that it is the stock of a tree which first gives out. Sometimes we have found them to be killed by the frost, sometimes bursting of the bark, and in 1884-5 we had them killed in the crotches—I lost sixty in that way. Such varieties as the Tolman Sweet and the Duchess would stand any year in almost any climate, and when we top-graft them in the branches we get above the point of most danger. It stands to reason that that hardy trunk is more able to carry up the nutriment to those tender varieties than its own trunk would be. [Mr. Caston here exhibited specimens of the King and Duchess of Oldenberg of about the same age and taken from about the same position in the orchard.] The wood of the Tolman Sweet resembles that of the Duchess very much. I claim we should have that kind of wood to resist the coldness in the winter. When Mr. Blake said he succeeded in growing the King by grafting it on a seedling he struck, a most important point. We cannot grow the King in our county successfully at all by growing the tree on its own roots. It is too tender. They will grow till they begin to bear, and then they will do the same as the Greening, the Baldwin and the Northern Spy; but you can grow them by top-grafting them on a native seedling or on a Tolman Sweet. I prefer the Tolman Sweet because you are absolutely sure you have a hardy stock to graft on. I think the Tolman Sweet is a longer lived tree, and it does not require so much training, and it forms a very nice top for grafting on. This grafting requires to be done while the tree is young; it is not a bit of use grafting on an old tree while the wood has become dark. Make about three graftings of it, and it takes but a very few to form a top. After my experience of twenty years along this line I think this question of grafting the best varieties of fruit is one of the most important in this Province of Ontario. It is perhaps not important to the Niagara peninsula or the southern counties, but it is to the northern counties. I think it would apply to pears as well as apples.

Mr. BLAKE: My experience in grafting Kings on the bearing trees has been most successful. They bear more heavily grafted on the bearing trees, while the trees that are grafted on to Kings while they are quite young are not as fruitful as those that have been grafted in late years on older trees. I have noticed that in grafting them on Golden Russets the Kings are more prolific bearers than when grafted on any other variety.

The King in this last twenty years will outsell any apple in this market. I could fetch Kings in this market and sell every bag; there would not be another apple sold till those Kings were sold.

Mr. RICE (Michigan): This matter was brought up in our Society, and Mr. Morrill, of Benton Harbor, made a statement that in his orchard he had a number of varieties of trees. Among others were the Tolman Sweets and he re-grafted his Tolman Sweets to some other variety growing alongside of it. As they came into bearing his re-grafted Tolman Sweets yielded him from year to year about an average of four bushels of fine apples more than the same variety in the rows adjoining. Now, if that is true it shows a great and very important difference in the amount of money you are going to take from your orchard; and I have taken pains to ask the people about the country if they have known of any instance where Tolman Sweets have been grafted to any other apples, and what the results were, and invariably they were heavy producers of fine fruit.

Mr. SHERRINGTON: I think there have been some good suggestions thrown out here for your experimental stations to take up; for instance this top-grafting on to different varieties of stocks. With us the King is not a good bearer at all. The trees seem hardy and thrifty growers, but they do not bear the fruit. In other locations not far away it is said that they bear very well. Now possibly there is something in the soil to cause this King to bear.

Mr. RACE: I did not know there was any difficulty about the hardiness of the King-

Mr. CASTON; Oh, yes.

Mr. BLAKE: There is a distinct variation between that apple and the one shown on the table.

Prof. CRAIG: One is from British Columbia and the other is from Ontario.

The Convention adjourned at 5.45 till 7.30 p.m.

FIRST DAY—EVENING SESSION.

This session was held in the Town Hall, Hon. John Dryden presiding.

Hon. Mr. DRYDEN said: I am very glad to meet you, gentlemen. I have come because I want the Fruit Growers' Association to realize that I am just one of themselves, and consequently I want the outside public to understand and know definitely that I am in hearty sympathy with the work you are engaged in, and that anything I can do at any time to further the work of the fruit growers or assist the work the Association is doing, I will be only too glad to do it. This Association is one of the oldest in connection with agriculture in this province. I remember the work it was doing in my younger days. When I was a young man I was a member of the Association, and I have now on the farm trees growing which came through this Association. I believe in those old days a good deal of the work of the Association was lost somewhat—that is to say, no real record was kept of it, and although good did result, not as much resulted as if a good record had been taken of what was done. No real record was taken of the results of sending out new fruits. At the present time the Government is not suffering any information of this kind to go to waste, but gathering it up for the benefit of the public. (Applause.)

Mr. J. S. COLE, Mayor of Woodstock, said: It affords me great pleasure to be here with you, and in my official capacity to welcome you. In doing so I am sure I voice the sentiments, not only of Woodstock, but of the surrounding districts, and I think the delegates last year deserve a great deal of praise for drawing the Convention to this town. It advertises our town to a great extent and brings strangers here. We are proud of our town, and consider it one of the best in the province. We are all interested in it, both young and old, male and female, and interested in the development of one of the industries that I look upon as almost in its infancy. I think the people are just waking up to the fact that there can be markets opened up for the productions of this country. (Applause.) While I am glad to see a number of men from our rural districts taking an interest in this industry, I regret that at this season of the year our town is not looking its very best. It has got on its winter mantle, and is not so attractive as it would be in June. I think in no town in this province are there people that take more pride in keeping trim and neat their premises and boulevards than in Woodstock. Our town is noted for its maple trees. I offer to you the freedom of the town, and extend to you a very hearty welcome. (Applause.)

ADDRESS OF WELCOME.

Mr. T. H. PARKER, President of the Local Society, read the following address of welcome :

Mr. Chairman and Gentlemen of the Fruit Growers' Association :

On behalf of the Woodstock Horticultural Society I beg to thank you for the honor you have done them in holding your annual meeting here under its auspices. The information that we may get from so many trained and experienced fruit growers and horticulturists will no doubt be very valuable to our members, as well as to the province generally. Your Association is doing a good work in developing the fruit growing capabilities of our country. No government can spend a reasonable amount of money to better advantage than in assisting such institutions as yours.

Our society has not been in existence more than nine months, yet we have about ninety members. We have not done much as yet, but hope that these meetings will stir us up to greater efforts. The annual meeting of your Association took place here about twelve years ago. I believe it was a most satisfactory meeting to all concerned. Trusting that this meeting may be equally so, I again thank you for your presence here.

Hon. Mr. DRYDEN : On behalf of the Fruit Growers' Association, I am asked to offer a few words in reply to what has been said by these gentlemen. I am sure the fruit growers appreciate the words of welcome that have been given, and the truthfulness of the remark about this being one of the best towns in the province. The difficulty with me is, I have just left another town where we had a meeting last night, which, they say, is best described as the Royal City, and they claim that is the best spot. It seems wherever you go there is a certain amount of pride which the local people have in their own town or city. I am very glad that is so. Often, in visiting various towns in company with the Lieutenant-Governor, I have seen over the archway the words, "Welcome to the Garden of Ontario." It seems every town and every city is the best, and every township and every county is the garden, and the only thing a stranger can conclude is that all the towns are beautiful and that all the country is a garden spot. (Hear, hear.) My friend, in giving us welcome, spoke about the information they will be likely to receive from these meetings. I am very glad he suggested that thought. That is just exactly one of the things that it is expected will be given to the public by an association of this kind. Since I have had the honor of occupying the position which I do in the Government of this province I have been endeavoring to use the information which you, gentlemen, bring to these meetings by extending it to the people generally, that a connection be made between the farmers of the country and my Department, and I have offered to give them all the information which you receive here in a report which will be published later on. I conceive in that way that I am fulfilling one of the legitimate functions of my existence as head of the Department, by conveying information to the people so that they will be enabled to do better for themselves than they have ever done before. I believe in the education of everybody, and this is one kind of education which I refer to. I believe that those who are to undertake fruit growing ought to know something about it; and I don't know any other means of disseminating information except to use the experience of the oldest fruit growers, and to have it put in such shape that those who cannot attend these meetings may read it in their own homes. Then my friend suggested that all classes of the community are interested in the work of this and other agricultural societies; that is another good thought which ought to be emphasized here. We have had such experience as compels us to the view that this country depends perhaps more than we have thought on the success of agriculture. All classes depend upon it. Depression in agriculture touches the agricultural pocket first, but it is now touching the pockets of the people who live in the villages, towns and cities, and whether they are willing to admit it or not, they are forced to the conclusion and conviction that it is nothing but the truth that if our agriculturists do not prosper neither can they. Therefore all classes of people should give a helping hand to carry forward this good work. We are glad to know that the fruit growers are to have

the freedom of this town. I would suggest that the Mayor did not mean that you are to go away without paying your hotel-bills.—(laughter)—What he means is that you are to have perfect liberty to walk up and down these beautiful streets without fear of being molested by anybody—(laughter)—He means that you are to have the use of your eyes here, and take whatever you can that will benefit you that you are permitted to see in the city. I trust that you will use the freedom he has just given, and that you will go away feeling that this is a good town in which to hold conventions, and that you may have some disposition to come back on another occasion. I am sure that every member of the Association will be pleased with their visit here, and I trust the meetings will be of such a character as that not only the people in Woodstock will receive information but that the members of the Fruit Growers' Association themselves will receive valuable information to aid them in their important work. (Applause.)

PRIVATE CONSERVATORIES.

Mr. D. W. KARN read the following paper :

I have had the above subject assigned to me for a short paper. In opening this question for discussion to-night I feel myself utterly incompetent to deal with the subject, having no knowledge or experience apart from the little I have obtained in connection with my own home life. Therefore I shall only speak of it from the standpoint of growing and producing flowers, shrubs and foliage plants for private use.

Most modern houses to-day, especially in our towns and cities, are lighted by gas, and when this is the case it is almost impossible to succeed in the cultivation of flowers, as the gas is a deadly element to all plant life. The only means to overcome this difficulty is to erect conservatories or greenhouses adjoining the house, but so separated as to exclude all the blighting effects of gas. In designing a conservatory, light, heat, air and water have to be considered. The simplest form of constructing a conservatory is a lean-to, so built as to face the south if possible. This can be made ornamental if so desired by means of architectural embellishments.

Heating is a very important item. The best and most approved method is hot water. There are numerous styles of hot water boilers, but they are all built upon the same principle, each inventor striving to expose the greatest possible heating surface to the action of the fire. It is preferable to heat the conservatory independently of the house, as during very severe weather it is necessary to force the fire in order to maintain a proper degree of heat, which in many instances would give too much heat in the house.

Ventilation is accomplished in various ways. In small houses by lifting or sliding the sashes placed in the roof for that purpose. Shading is required as spring approaches, when the rays of the sun increase in power and light. This can be accomplished by washing the glass with lime-wash or with whiting and milk, but if you prefer you can use a screen of muslin or thin cotton.

A conservatory covering some 550 feet of surface measurement and about 5,000 cubic feet of air space can be sufficiently heated in all kinds of weather with a hot water boiler costing from \$50 to \$75 and will consume from five to six tons of coal a season, so that with an outlay of \$250 or \$300 apart from the running expenses any one may have a conservatory, together with all the enjoyment and pleasure of being surrounded during the dreary months of winter with beautiful flowers and green foliage. To love and cultivate flowers is one of the few pleasures that improve alike the mind and heart and make every true lover of these beautiful creations of infinite love, wiser, purer and nobler. It is a pleasure that brings no pain, a sweet without a snare. If we would develop and increase the appreciation of the beautiful and our ability to enjoy the marvellous beauty which is everywhere around us we must have the educating and refining influence of plants and flowers in the home. Our homes must be made attractive so that lasting influence for good may be thrown around those entrusted to our care. The

Creator doubtless could have made a world without a flower, but He in His wisdom did not do so, and after creating man in His own image He placed him in a beautiful garden in which was every plant that was pleasant to the sight or good for food. When man became a law breaker he was expelled from this garden and had to work for food among the thorns and thistles. In all parts of the civilized world to-day the refinement, innocence and happiness of the people may be measured by the flowers they cultivate.

The conservatory places within our reach at all times plants and flowers for the decoration of our parlors and dining rooms. There is nothing to my mind that lends so much charm and beauty to any home as a tasteful disposition of plants and flowers. The amount of genuine satisfaction, rest and pleasure that a business man receives and enjoys in spending a few minutes in the conservatory each and every day more than repays him for the additional expense incurred in maintaining the same. I am convinced that many who could afford the expense of a conservatory if they would only try the experiment would be loud in their praises of the pleasure and satisfaction derived therefrom.

The necessary materials used in building a conservatory can be purchased already manufactured to shape, so that any ordinary carpenter can easily construct and complete the work. The putting in position of the hot water pipes is only the work of a few hours by some competent steam or pipe fitter. With the conservatory thus completed you are in a position to cultivate successfully plants and flowers, native and otherwise.

THE ONTARIO AGRICULTURAL COLLEGE AND HORTICULTURE.

Dr. MILLS said: Not being a horticulturist, I have but little to say to you this evening, therefore I asked the chairman to be so kind as to allow me to speak what little I have to say before my friend Dr. Saunders, who has had so long and so varied an experience as a horticulturist, that he might have the remainder of the time at the disposal of the meeting. I desire first of all to congratulate you most sincerely on the work which you have done and are doing from year to year in this province in sending out new varieties of plants and fruit trees to be tested by the members of the Association in different localities: secondly, in preparing lists of apples and grapes adapted to the different climatic conditions which we find in this province. I think that a very valuable work, and I hope you may extend it to cover plums, raspberries, pears and some other fruits. Thirdly, I congratulate you on the dissemination of much valuable information through the publication of the *Canadian Horticulturist*, which has done and is doing such valuable work. Fourthly, I congratulate you on the publication of so valuable papers, addresses and discussions in your annual report—so valuable as to amply justify the Minister of Agriculture in spending the public money in distributing it to the people and farmers of the province at large. Fifthly, I congratulate you on the help you are giving to the Minister of Agriculture in carrying on the work of our provincial fruit and experiment stations. That help already given has been valuable, and we expect to have it continued. Sixthly, I congratulate you on the very valuable assistance which you gave the Government in making so excellent an exhibit of fruit at the Centennial Exhibition in Philadelphia and at the great World's Fair in Chicago. (The chairman: Hear, hear.) I have often asked myself whether it was really possible that at that great Fair, with such extraordinary competition as there was there in fruit, that this Province of Ontario should actually receive about thirty-five per cent. more marks or points for its fruit exhibit than any state in the United States. Think of it. Thirty or thirty-five per cent. ahead of California, of Florida, and of the great State of New York, of Oregon, and of every other state in that great country. It seems to me a very great achievement, and that great credit is due in the first place to the ability, industry and enterprise of our people at large; in the second place, to the assistance given by the Government to make that exhibit; in the third place, to the help of this Association from its directors and members all over this province; and fourthly, and largely to our friend Mr. A. H. Pettit, one of

the esteemed members of your Association. (Applause.) Now, I have often thought of that achievement. I don't know why it has rested on my mind so much, but it actually has, because it seems to me so extraordinary indeed; and as often as I did so I have said to myself that of the many wise and good things which the Hon John Dryden has done since he became Minister of Agriculture, he never did a wiser or more magnanimous thing than when he selected a strong pronounced political opponent, Mr. A. H. Pettit, to prepare our fruit exhibit and to take charge of it at the World's Fair at Chicago. (Applause.) I say it is a blessing to a country when men in high places do the best thing for the country regardless, to some extent at least, of party claims and party demands. (Hear, hear and applause.) Now I want to say that in my own judgment Mr. Pettit did his work there about as well as it was possible for any man to do it; and had a less able, less shrewd and less energetic man charge of the work of preparing that exhibit and looking after it in Chicago, the results would I know have been very different, because he had very able and very shrewd men to compete with at that great World's Fair. Now, I came here merely to bring greetings from the Agricultural College at Guelph, from the staff of that institution, and tell you we are interested in your work and wish you abundant success in every department of it. We are doing something in horticulture at Guelph, but in judging us I wish you always to bear in mind two things: First, that our climatic conditions at Guelph are very unfavorable—I believe even more unfavorable than at Ottawa, as some of you know—and in the second place that we cannot, like our friends at Ottawa, devote the whole of our time to experimental work. At Guelph our chief work is to instruct the young men who come to us from year to year, and our horticulturist, like other members of the staff, has to give altogether the greater portion of his time to education rather than to experimental work. We are doing something along the line of horticulture at Guelph. We have a course of lectures on fruit growing concerning the varieties grown in this province, methods of preparation, planting, cultivation and all the rest of it; second, on vegetable growing; we have a large vegetable garden for practical instruction and a full course of lectures on the growing of vegetable; third, on floral culture to some extent; and in the fourth place to a limited extent landscape gardening. That is the outline of our course of instruction in the department of agriculture. In addition to that we have, I think, a pretty thorough course of practical work in the outside department. In grafting we have practice throughout the winter; we have a building and all appliances adapted to that work until students become somewhat proficient in the work of grafting. We have pruning work in season on apples, raspberries, vines and other plants. We do something at hand-pollination, and endeavor to give a practical course in testing and planting seeds, the preparation of plants by cuttings, by budding and transplanting, the preparation of soil for greenhouse plants, and in the preparation and application of spraying mixtures. As to the equipment for work in horticulture, we had very little until the present Minister took charge of the Department of Agriculture. I think now we can claim to be as well equipped in these lines as most institutions on the continent. We have a nice young orchard—I am sorry to say it is a young orchard, because a good many mistakes were made years ago in planting out orchards there in the wrong place, and they had to be rooted up. We have a fair-sized vineyard, a small-sized fruit plantation presenting a fair variety; we have eight acres in forest-tree plantation; a good arboretum on the College lawn arranged originally by our friends Messrs. Saunders, Bead'le, Beall, Dempsey and some others. It has since grown to be a very fine one, and of great service to us in instruction. Then we have a large group of flower beds in front of the College throughout the summer and autumn, and we have a garden of about six acres devoted every year to the growing of vegetables for practical purposes, and also for purposes of instruction. We have six good greenhouses, I think up to the requirements of the present time—one large house for forcing vegetables for winter and early spring growing lettuce, radishes, cauliflowers, rhubarb, cucumbers and tomatoes all through the winter and until such vegetables can be obtained from the outside in early summer. Then we have a good propagating house with a very good propagating oven in it, and an intermediate house, a tropical house, a conservatory, and perhaps what is more important, we have a house that is adapted more es-

pecially for laboratory work of students in hybridizing, seed-testing and other things of that kind, and close by we have a large and commodious class-room so arranged that the plants can be taken in there all the winter through to illustrate lectures on horticulture and botany; and in conjunction with that class-room we have also a room for microscopy, furnished with microscopes and all other appliances necessary for the study of plant physiology and plant etiology, including all the injurious fungi that fruit growers are struggling against at this present time. So that you see in our course of instruction and our practical work we have a fair outline for doing something that ought to be of value to the students who come to us, and also to the province at large. We have not had this equipment long, and have only got nicely to work, but we hope in the near future to be able to do something that will be of benefit to you and to us and to the country in which we live. Now I wish to refer to one or two items of our experimental work. I wish to tell you that the black walnut is growing very nicely with us, to our surprise, notwithstanding the inclement climate of Guelph. We have a nice clump that was planted in 1880. The growth is slow, but the trees are growing healthy. The average diameter is between five and six inches, some of them reach between seven and eight inches in diameter. This is something we scarcely expected in the neighborhood of Guelph. Last year our horticulturist, Mr. Hutt, planted 123 varieties of strawberries in a plot near the College, and if he can protect them from the students and citizens and visitors we have through the summer we hope he may be able to report something in regard to that work not many months hence. We have only begun experimental work, and the time is chiefly taken up with teaching, but we hope to do something more in that line. (Applause).

The CHAIRMAN: Mr. Mills has referred to my magnanimity in appointing my friend Mr. Pettit, but he does not know I have had to suffer for it. Not long ago I was engaged with a member of the Conservative party, and this was one of the attacks he made upon me, that we had spent too much money in connection with the World's Fair. He read two or three items, and two names were mentioned. One of these was my friend Richard Gibson, of Delaware, and the other my friend Mr. A. H. Pettit. When I took occasion to tell my good man that these two men, whose names he had read out, were members of his own party, he blushed all over his face and wished he had not said anything about it. (Laughter.) But I said these men belonged to a different type of Conservative to what he happened to belong to. Mr. Gibson and Mr. Pettit are both loyal to the best interests of their province, whereas this man wanted to find fault with us because we were holding up our province to the gaze of the world and advertising our products everywhere. (Applause).

THE PROGRESS OF HORTICULTURAL WORK AT THE DOMINION EXPERIMENTAL FARMS.

Prof. SAUNDERS, in introducing his paper said: While sitting here, I could not help recalling the scene of twelve years ago, when I had the pleasure of being present in this same room at the annual meeting of this Association. I was thinking what a world of change has taken place during those twelve years—the great volume of information that has been given to the public on the subject of fruit growing, and the wonderful advancement that has taken place over the whole of the Dominion in the cultivation of these most valuable articles of diet; the twelve volumes of the *Horticulturist* that have been published since then, replete with information in every direction; the twelve annual reports of the Fruit Growers' Association which have been distributed among thousands of farmers, carrying to them all the information they need in regard to the cultivation of varieties; the enlightened measures which have been adopted by the Province of Ontario; of this preparation of which we have heard so admirably from Dr. Mills for the instruction of young men at Guelph, which has all been established since we last had the pleasure of meeting at Woodstock—not the instruction itself but its horticultural department—largely through the earnest efforts of Dr. Mills, aided by the kind help of the good Minister of

Agriculture at his back ; and the young men of the present day have all these advantages which we old fellows of the past have never had the privilege of using. However, we have done our best. I miss some faces to-night that were here twelve years ago. Some have gone to their long rest—some noble men who have done good work. I am thankful, however, that a good many of the old faces remain to grace the present meeting, and I hope that those who are here of the old stock, as well as many of the new, will be spared for many years to continue the good work they have been doing. The study of horticulture embraces both the science and art of the cultivation of fruit, garden, plants and ornamental trees, both for educational purposes and for use. The art of gardening is a very ancient and honorable one, and is very congenial to man's nature ; it exerts a refining and elevating influence which no other occupation can give.

The study of horticulture embraces both the science and the art of the cultivation of garden plants, fruits and ornamental trees both for decorative purposes and for use. The art of gardening is an ancient and an honorable one and very congenial to man's nature over which it exercises a refining influence. The careful student of the sacred word will observe that in the earliest mention we have of a garden, in Genesis 2, that the beautiful and ornamental is placed before the useful. In the 9th verse of that chapter we read, "and out of the ground made the Lord God to grow every tree that is pleasant to the sight and good for food." Thus provision was made that the sense of beauty which the eye detects and which captivates and refines the mind, should be fed at least equally with the grosser sense of bodily appetite the outcome of our physical needs. In a new country, however, like ours, where at first the struggle for subsistence is keen and the subjugation of nature to man's needs a primary consideration, the regard for the useful naturally takes precedence. It is needful for man's existence that he be fed, and in the steady improvement which has taken place in the condition of our people we want our diet now to include choice viands. Thus fruit growing has become a very important branch of industry, the magnitude of which is only understood by those who have looked into the subject carefully, and the possibilities of fruit growing in this great Dominion cannot yet be estimated. In the Act of Parliament by which the experimental farms were established, among other objects of research prescribed, was that of testing the merits, hardiness and adaptability of new and untried varieties of fruits, vegetable plants and trees, also to conduct experiments in the planting of trees for timber or shelter. Thus the whole domain of horticulture was included. During my remarks on this occasion I hope to be able to show you that this important division of the work has not been neglected at any of the experimental farms. In order to present this subject to you clearly it will be necessary that I treat of each farm separately since they are located in widely different climates, in each of which there are difficulties to encounter.

Perhaps it would be well that I should give you at the outset a very brief sketch of the system of Dominion experimental farms and indicate to you the districts which these several farms are intended to serve.

The experimental farms of the Dominion of Canada are five in number and contain in all more than 3,000 acres of land. They consist of a central farm near the Capital, Ottawa, and four branch farms. The central farm has been established near the boundary line between Ontario and Quebec, and serves the purposes of both these important provinces. One of the branch farms has been located at Nappan, Nova Scotia, near the dividing line between Nova Scotia and New Brunswick, and serves for the three Maritime Provinces. Another has been established at Brandon, in Manitoba, for the Province of Manitoba, a third at Indian Head, in the Provisional Territory of Assiniboia, as an aid to agriculture in the North-west Territories, while the fourth has been located at Agassiz, in the coast climate of British Columbia, where it serves a like purpose for that province.

At all these farms many experiments are in progress in all branches of agriculture, horticulture and arboriculture, and much has already been done towards solving many problems of great importance to farmers and fruit growers. In selecting the sites for the Experimental farms due regard has been had to the great variations in climate in differ-

ent parts of the Dominion, and they have been so placed as to render efficient help to the more thickly settled districts and at the same time to cover the most varied conditions which influence the operations of the farmer and fruit grower in Canada.

Let us first look eastward and glance at Prince Edward Island, one of the most fertile districts in the Dominion. Fruit growing there has thus far been somewhat limited, but most of the orchards which have been planted and looked after with a reasonable degree of care have done well and there seems no reason why the cultivation of fruit could not be much extended there with great advantage to the people. Increased attention is now being given to this subject on the Island, and young orchards are being planted at many different points.

In Nova Scotia fruit growing has made wonderful progress especially of late years, and notably in the Annapolis valley. Eight or nine years ago this industry in Nova Scotia was almost confined to this valley, but since then orchards have been planted in many other districts with much success, and now it is generally held that apples of first quality as well as many other fruits can be grown to advantage in many other parts of Nova Scotia. The Annapolis valley has undoubted and special advantages in the way of suitable soil and shelter, and large crops of beautiful bright colored and high flavored fruits are annually produced there.

Foremost among the apples grown in this favored locality stands the Gravenstein, a handsome, yellow apple, of a delightful flavour and crisp and juicy flesh, which now commands high prices in Great Britain and is much appreciated in Boston and other cities across the border. The Gravenstein is a European apple which originated at a place of that name in Germany, and it is highly prized as a table apple throughout Central Europe. Several years ago a red sport of this apple occurred in the Annapolis Valley, in the orchard of a Mr. Banks, and this apple is now known as the Banks. The beautiful red colour with which this sport is adorned on a yellow ground makes the apple very attractive for dessert purposes. It is singular that a red form of this apple has originated in Germany, and two other forms in Denmark, which are striped with red.

The Gravenstein, from Gravenstein, of the German catalogues, is described as a large, splendid, yellow table apple, of very fine flavour, ripening from October to January. The red Gravenstein is spoken of as similar in size and quality, but red, and the time of ripening is from November to February.

In a European catalogue of Danish apples, the ordinary Gravenstein is said to ripen from October to January. Gravenstein, of Gundestrup, is said to be a large table apple, of excellent quality but striped with red; ripe October to January. There is also a Gravenstein of Tarnborg, which is described as large, of a very fine yellow color, striped with red on those parts exposed to the sun. This is said to be the finest of all table and market apples. It is singular that this variety of apple should have shown such tendencies to sport, mainly in the matter of color, at such widely distant points and under different conditions of climate.

The Baldwin, which is a native of Massachusetts, is also largely grown in the Annapolis Valley, and the trees bear very heavy crops. The Nonpareil is another favorite there. This is a russet, of English origin, of good flavor and an excellent keeper. Of late years there have been very extensive additions to the orchards in this valley, and the output of fruit is rapidly increasing. All varieties of apples can be grown there, also plums, pears and cherries.

The Bear River district, which is situated a few miles below the town of Annapolis, is the most noted locality in Nova Scotia for cherry growing. Several years ago I paid a visit there at the time the cherry season was at its height, and was astonished at the number of cherry trees growing in that neighborhood and at the large crops produced. The cherry seemed to be one of the commonest trees in the locality. They were to be found everywhere, in orchards, gardens and fields and even along the roadsides, where the laboring man going to and fro to his work, or the traveller passing through the district, could halt and refresh themselves at will. In looking over some of the orchards

I was surprised at the absence of most of the familiar cultivated forms, and a careful examination convinced me that the greater part of the cherries grown in that section of the country were seedlings of some of the better named sorts. There were among them cherries of every shade of color, and great diversity of foliage. Most of the foliage partook of the Bigarreau type, some resembled that of the Dukes and Morellos, and others again were more or less intermediate in character. The best of the seedlings were increased by budding them on the less desirable sorts and in this way, the average product had been brought up to a good standard of quality. Thousands of boxes of cherries are sent yearly from this district to St. John, Halifax and other cities.

When the Experimental Farm was started at Nappan, N. S., it was the general opinion that fruit would not succeed there, but experience has since shown that apples can be grown successfully not only there, but in many other parts of Nova Scotia, which were at that time thought to be unfavorable for fruit growing. At the Experimental Farm at Nappan we now have under test 288 varieties of large fruits and seventy five of small fruits. We also have in the ornamental plantations 279 varieties of trees and shrubs. These large plantations are being increased from year to year and are assisting in awakening much general interest in horticulture in the provinces.

NOVA SCOTIA.

Number of varieties of fruits under test at Nappan, N.S., at the close of 1895 :

Large Fruits. Apples, 147 ; pears, 36 ; plums, 41 ; cherries, 39 ; crab-apples, 12 ; apricots, 3 ; nuts, 10 ; total, 288.

Small Fruits. Grapes, 9 ; Strawberries, 20 ; Raspberries (red, white and black), 15 ; Blackberries, 4 ; Black currants, 3 ; red and white currants, 8 ; gooseberries, 15 ; dwarf juneberries, 1 ; total, 75. Grand total, 363 ;

Fruit growing is also advancing, although less rapidly, in some parts of New Brunswick. The climate of this province is less favorable to the growth of large fruits, nevertheless apples, in many localities, have done well. The growing of late strawberries for the Boston market is quite an important industry in some sections of New Brunswick, for the reason that the cool summer climate enables the growers to place their fruit on the market in first-class condition after the crop in all competing districts is over.

CENTRAL EXPERIMENTAL FARM, ONTARIO.

Much progress has been made in horticulture at this institution. The fruit department at first was in charge of Mr. W. W. Hilborn and subsequently under that of Mr. John Craig. In the report given by Mr. Hilborn of the progress of the work to the close of 1887 he gives the number of varieties of large fruits then under test as 556, and of small fruits 325, total 881, as follows :

Large Fruits. Apples, 297 ; pears, 101 ; plums, 72 ; cherries, 71 ; peaches, 11 ; apricots, 4 ; total, 556.

Small Fruits. Grapes, 127 ; currants, 20 ; gooseberries, 30 ; raspberries (not including 200 seedlings unnamed), 38 ; blackberries, 20 ; strawberries, 90 ; total, 325. Grand total, 881.

Since Mr. Craig took charge of the fruits the number has been largely increased, and the varieties of large fruits now under test number 788 and the small fruits 604, making a total of 1,392 varieties to watch over and take notes of.

The climate of Ottawa is too severe to admit of the cultivation of peaches, apricots or nectarines, or of the finer varieties of plums or pears or of Bigarreau cherries. Nearly all the varieties of these fruits readily obtainable have, however, been tried with the hope that some might be found sufficiently hardy, but they have nearly all failed. Some of the finest varieties of apples have also proven too tender for this district, which, while it is colder than western Ontario, is fairly representative of the settled portions of eastern

and northern Ontario and of the Province of Quebec. The collection at the Central Farm is particularly rich in Russian varieties of apples; also in the improved forms of the native plum. To both of these classes of fruit Mr. Craig has given special attention. Grapes have done remarkably well at this farm and the collection now contains 176 varieties, nearly 150 of which ripened their fruit fairly well last season. A large collection of varieties of English gooseberries has been accumulated which it is now expected can be grown successfully since a remedy has been found for the mildew. Including the American sorts, of which there are not many, this group now contains 128 varieties. This large collection of fruits is very instructive, and Mr. Craig has done much to disseminate some of the large fruits found to be specially worthy by distributing scions to applicants for grafting.

The number of varieties of fruits under test at the Central Experimental Farm at the close of 1895 was as follows:

Large Fruits. Apples (American, 209, Russian, 225), 434; crab-apples, 17; cherries, 94; plums, 166; pears, 55; nuts, 9; peaches, 5; quinces, 4; mulberries, 4; total, 788.

Small Fruits. Grapes, 176; raspberries (red, yellow and black), 110; blackberries, 25; gooseberries, 128; currants, 21; strawberries, 140; juneberries, 4; total, 604. Grand total, 1,392.

The possibilities of extending the fruit growing industry in Canada are almost unlimited, and with ample cold storage facilities so as to admit of shipping to distant points in good condition the markets may be much enlarged and production greatly stimulated.

A large amount of work has also been done at the Central Farm in the testing of vegetables by Mr. Craig.

In the planting of ornamental trees and shrubs excellent progress has also been made at this institution. It is only eight years since this branch of the work was begun, and now in the arboretum and botanic garden (to which sixty-five acres of land have been devoted) together with those other portions adjacent to the buildings which are devoted to ornamental work, a very large collection, numbering more than 1,000 varieties has been brought together for test, and quite a large proportion of them are proving hardy. The results of these experiments will do much to demonstrate the favorable character of the climate of eastern Canada.

(The speaker here showed photographs of views of the Farm and of the trees and shrubs).

It has long been a reproach to Canada that while most of the smaller colonies of Great Britain were doing efficient work in this direction, Canada, one of the brightest gems in the British Empire, with enormous possibilities, had done nothing. This stigma has been removed and a collection worthy of the country is being rapidly brought together, comprising many of the most desirable and beautiful forms from all parts of the world.

Apart from the scientific value of this collection which is very great, the charming effects produced by the judicious grouping of the more ornamental species is of great educational use to the public generally, and the visitors to the farm, who number many thousands each year, carry home with them pleasant memories of these beautiful pictures in landscape art, and many thus become inspired with a desire to beautify and improve their own surroundings, and thus bring these elevating and refining influences to bear on their own households.

One of the most striking features in connection with this ornamental work, is the large number of sample hedges which have been planted. Experiments are being tried with more than sixty varieties of trees to determine their fitness for this purpose. These hedges are arranged in a regular series, each being fifty feet long and ten feet apart. Experiments are also being carried on with all the more valuable timber trees for the

purpose of determining their annual growth in this climate, and the relative time required to produce merchantable timber. Twenty acres of land are devoted to these timber-tree tests,

Lovers of flowers will also find at the Central Farm much to interest them. Apart from the botanic garden which now contains more than 800 species and varieties of hardy perennials, there are special beds devoted to particular plants which are worthy of mention. First, there is a fine collection of that queen of flowers, the rose. Of hybrid remontants there are more than 200 varieties, and of the more tender perpetual bloomers about seventy-five different sorts. The hybrid remontants are cut back before winter to about a foot in height and earth thrown up around the stems to a depth of eight or nine inches and the whole lightly covered with strawy manure from the barn-yard. Under this treatment most of the varieties usually winter well and produce a wealth of bloom in June and July, and more or less flowers from then on to October. There is also a large collection of peonies, embracing 131 varieties, another of Irises with more than 200 varieties, including a large number of the Japanese sorts, forms of *I. Kempteri* with flowers measuring from five to seven inches across, which seem to stand our climate perfectly. There are also large beds of lilies, including sixty-four species and varieties. Other beds are devoted to pansies, gaillardias, Dianthus, tulips, hyacinths, narcissi and gladioli, and others to mixed annuals and perennials.

A new feature in this branch of the work has lately been started in a series of large beds devoted to the wild flowers found in different parts of the Dominion. One of these is devoted to Ontario, another to Quebec, and others to the Maritime provinces, Manitoba, the Northwest Territories and British Columbia, the object being to show in these beds those species of native growth which are most conspicuous for their beauty and valuable for cultivation.

A conservatory in connection with a propagating and seed-testing house contains an interesting collection of economic plants, orchids and the newer varieties of house plants.

MANITOBA.

Passing now by a long stride of about 1,500 miles we bring you to Brandon, Man., where the most easterly of the three western experimental farms is located. Here there are climatic difficulties to contend with which interfere with the successful cultivation of most of the large fruits. For this reason the experimental tests have been mainly confined to the hardiest sorts. Since the establishment of this farm 241 varieties of large fruits have been tried, including all the hardiest forms obtainable from Siberia and other parts of Russia, and from other cold climates in northern Europe. These have consisted of

Large fruits, now mostly dead: Apples, 175; pears, 14; plums, 22; cherries, 18 crab-apples, 12; total, 241.

Small fruits, mostly living, except grapes: Grapes, 26; strawberries, 18; raspberries, 29; blackberries, 9; black currants, 22; red and white currants, 13; gooseberries, 24; dwarf June-berries, 1; total 147; grand total, 388.

These tests have been several times repeated during the past six years with the object of testing these fruit trees under various conditions of shelter, but up to the present time very little success has attended the efforts made. We have succeeded in fruiting several varieties of the wild plum, which is native in some parts of Manitoba, and is perfectly hardy, and much attention has of late been given to the securing of such improved varieties of the wild plum as have been originated in the north-western States, especially in Minnesota. It is believed that in a short time an orchard consisting of these improved forms of the wild type can be successfully established, and that these varieties of fruit will be very acceptable and useful to the people.

No success worthy of mention has yet attended the testing at Brandon of any of the hardy varieties of apples, nor of any of the crab-apples grown in the east. There is, however, one wild crab, a very small one with fruit about the size of a cherry, which was

obtained from the northern part of Siberia, which has stood the climate perfectly for the past four or five years, and during the last two seasons has borne some fruit. Experiments are now being conducted with the object of improving this fruit, and in 1893 this Siberian variety, known as the berried pyrus (*Pyrus Baccata*), was cross-fertilized with pollen from some of the hardiest varieties of apples, such as Duchess, Tetofsky, Wealthy, Yellow Transparent, and Anis, also with pollen from the Hyslop and Transcendant crabs. The seeds obtained from these various crosses were sown, and we now have about 150 one-year old trees as the result of this work. It is hoped that in four or five years when these young trees come to fruit, that there will be found amongst them some improved forms such as will be serviceable to the people of Manitoba. This is slow work but it is being prosecuted with as much haste as nature will admit of.

Sand cherries have also succeeded well. Among these there are promising forms from different sections of the country which vary much in size, colour, and quality, some of them being very good and serviceable.

A fair measure of success has attended the experiments with some of the small fruits, of which 147 varieties have been tested. The most successful have been the red, white and black currants, and gooseberries, and also the hardier sorts of raspberries. Strawberries have been a partial success, but all attempts to grow our eastern varieties of grapes have thus far failed. Examples of the wild frost grape found growing in the Red River valley have of late been secured and planted, and it is hoped that eventually some improved forms of this fruit may be obtained from that source.

A much larger measure of success has attended the experiments with ornamental trees and shrubs, and there are thus far about 100 species and varieties which have proven hardy at this farm. Every year some additions are being made to this list, which will, no doubt, in time assume goodly proportions and give to the people of Manitoba sufficient material for the beautifying of their homes, not only in the cities but also on the prairie farms.

THE NORTH-WEST.

Another step of 183 miles brings us to the next experimental farm at Indian Head in Eastern Assiniboia, one of the Northwest Territories. While this is one of the finest grain-producing districts in the whole northwest the conditions of climate which prevail during the winter and early spring are, I think, less favorable for tree growth than those of Manitoba. A similar line of experiments to those conducted at Brandon have been carried on here with large fruits, involving the testing of 203 varieties of large fruits, nearly all of which have failed, and 127 varieties of small fruits, a part of which have been successful.

Large fruits, tested at Indian Head, mostly dead: Apples, 154; pears, 9; plums, 14; cherries, 14; crab-apples, 12; total, 203.

Small fruits, mostly living, excepting grapes: Grapes, 26; strawberries, 16; raspberries, 26; blackberries, 4; black currants, 16; red and white currants, 14; gooseberries, 23; miscellaneous sand cherry and dwarf June-berry, 2; total, 127; grand total, 330.

The successes referred to at Brandon with the *Pyrus Baccata*, the Manitoba wild plum and the sand cherry have been repeated here. Many varieties of currants, gooseberries and raspberries are cultivated with a fair measure of success. The proportion of failures to successes in the experiments with strawberries have been very large, while grapes have thus far failed entirely. In the growing of ornamental trees and shrubs the success has been encouraging, and we now have upwards of ninety varieties which have proven hardy at this farm.

BRITISH COLUMBIA.

We now skip over 500 miles of plains and another 500 miles of mountains and find ourselves in the coast climate of British Columbia, where the most westerly of the experimental farms has been located, about seventy miles east of Vancouver. Here the climate

is mild, and much resembles that of some parts of England, and the apple, pear, plum, and cherry thrive wonderfully well and produce abundant crops. Since fruit culture promises to become one of the most important industries in this province, a very large number of varieties have been brought together for test, nearly all of which are doing well. The test orchards at this farm now contain, I believe, the largest number of varieties of fruit to be found in any one place in the world.

At present the large fruits number 1,204, and the small fruits 393 varieties, making a total of nearly 1,600 different sorts, and when the orders for the coming year, which have been placed in Europe and the United States, are filled, and some additional varieties sent from the Central Farm, the number will exceed 2,200 in all.

The number of varieties of fruits under test at Agassiz, B.C., at the close of 1895, were:

Large fruits: Apples, 508; crab-apples, 28; pears, 154; plums, 176; cherries, 86; peaches, 159; apricots, 22; nectarines, 15; figs, 15; quinces, 5; medlars, 3; mulberries, 8; nuts, 25; total, 1,204.

Small fruits: Grapes, 101; strawberries, 98; raspberries, red and white, 41; raspberries, black, 18; blackberries, 29; black currants, 37; red and white currants, 23; gooseberries, 42; miscellaneous, 4; total, 393 Grand total, 1,597.

For profitable growing in that climate I would place plums first, which bear wonderfully heavy crops, followed by apples, pears and cherries, all of which do well. Peaches, apricots and nectarines have not yet given satisfactory results, although the trees usually come through the winter well and more or less fruit is borne. Figs, quinces and medlars have been tried for several years without much return; the trees, however, are young yet. The larger mulberries have produced excellent crops. Many varieties of nuts are under test, and most of them are doing very well, some of the filberts having borne good crops for the last two years. The English and Japanese walnuts, the Spanish and the improved varieties of American chestnuts, and a number of varieties of almonds are all making good progress and promise well for the future.

In addition to the large orchards which have been planted in the valley land on this farm, four orchards have been set out on the bench lands on the side of the mountain at the back of the farm. These have been planted at different heights from 150 to 1,050 feet above the valley. The trees and vines on the mountain side have made excellent growth and they are earlier in blossoming in the spring and in maturing their fruit in the autumn than those planted on the level. This is a very important experiment for that province, for the reason that there is a very large quantity of such bench land which is of no value for the purposes of general agriculture and when it is fairly proven that fruit can be profitably grown in such locations a great impetus will be given to this industry.

With a climate so favourable as to permit of the wintering of the Rhododendron, European Holly, Yew, Laburnum and the Laurels, it is not surprising that a very large number of ornamental trees and shrubs succeed there, and this we have found to be the case. Some 500 or 600 species and varieties have been tested already and many others are under trial.

Experiments are also being carried on with forest trees, especially with the more valuable hardwood timber trees of the east, with the object of ascertaining whether these useful species will grow to advantage in that climate. British Columbia with all its wealth of timber has scarcely any hard-woods. None of the most valuable eastern species being represented in that country. About twenty thousand young trees have been planted on the mountain bench lands, consisting mainly of black walnut, ash, elm, hickory, oak, wild cherry and butternut and many of these are growing well. If they succeed and grow as rapidly as other timber trees in that climate, this will be a great incentive to the planting of these useful species on a larger scale with the view of eventually supplying the needs of British Columbia in this particular.

From this somewhat hurried summary it will be seen that much progress has already been made in horticultural work on the experimental farms and much more is being planned. To some whose eyes have not been opened, or whose senses have been blunted by the pressing cares of life or the greed of gain, nature is almost a sealed book. They see but few of its beauties, enjoy little of its pleasures, and often look on the expenditure of money on such objects of interest as wasteful. Are not these lovely shrubs and trees and flowers which combine so much grace and beauty and which afford such quiet delight to all lovers of nature, expressions of the thoughts of the great Creator? He has established and sustains the laws which govern their growth and which bring about those marvellous changes in form and in color which have given us some of the most beautiful things we have in cultivation. Who would be so presumptuous as to say that what the Creator has made and pronounced good is not worthy of man's attention and study? On the contrary, I would say with the old writer "What God has thought it worth His while to create is worthy of man's careful attention and enquiry." These objects afford us pleasing lessons for contemplation at all times. We may allow our thoughts to dwell on the seed with its store of nourishment laid up within, with which to feed the young germ when favorable conditions call it into active life, and which serve to sustain it until the roots are sufficiently developed to gather food from the soil. We may study the young plantlet when it first appears above ground and watch from time to time its growth and progress to maturity. Can we not learn lessons of wisdom from the wonderful system of circulation it has, by which the elements of nutrition are taken in by the tiny rootlets and carried from thence to the leaves to be elaborated and fitted to serve its purpose in the gradual building up of the structure. Further, from the admirable manner in which the bundles of woody tissue are put together, which give strength to the tree, which enables it to resist the force of wind and storm, and also to form timber of different degrees of strength and of various textures suitable for man's use. We may also study with profit the wonderful arrangements whereby the exhalations of animals, which would otherwise soon poison the atmosphere, are taken up and appropriated as food by plants, and the stores thus made and laid up in the tissues of the plant become again suitable and nourishing food for the animal, and thus the wonderful circle of harmony between the animal and the vegetable world is maintained. We may also study with profit the wealth of grace and beauty displayed on every hand, which captivates and refines the mind and leads us from nature up to nature's God.

Let it be the aim of this useful Association to strive to elevate the tastes of its fellow-citizens, first, by cultivating the very best sorts of fruits, with which to supply their tables, and next by assisting them to introduce into their gardens and about their houses some of the very beautiful forms of trees and shrubs which have been shown to be hardy in our climate. Let them grow as nature has intended them to do, and gradually develop their special forms of beauty without mutilation. Then those who see them will not long lack that inspiration which will prompt to imitation, and thus the good work will progress, extending its refining influences far and wide, and diffusing happiness and contentment among its possessors. Let us not forget the lesson taught us by the great Master in that remarkable sermon on the Mount when He gazed on the beautiful lilies growing about Him and said: "Consider the lilies; for I say unto you that even Solomon in all his glory was not arrayed like one of these."

The meeting closed at 10.30 by singing the National Anthem.

SECOND DAY—MORNING.

By the courtesy of the local Horticultural Society and the Mayor and the corporation of Woodstock, the delegates to the convention were driven through the town.

At Woodstock College the delegates took particular pleasure in inspecting the work of the manual training department, which was in full swing, the students working in wood and iron, and all the machinery being in motion. The physical science department

also excited considerable interest. An elaborate luncheon was served, and at its conclusion Principal Bates voiced the welcome of the management of the college to the delegates, making allusion to the similarity of the work of the college and of the Association in regard to the soil, best methods of cultivation, nature of the seed sown and of the fruit expected, the atmosphere, etc.

Mr. G. R. Patullo, County Registrar, responded on behalf of the local association. He referred to the way in which Canada, at the World's Fair, distanced all competitors in the fruit department. In cheese making, which had been learned from our American friends, Canada had shown at the World's Fair, that in this, as in many other institutions the pupil had excelled the teacher. We beat them at their own game, so to speak. (Applause and laughter.) We have been surprised to learn that Ontario is such a splendid fruit-growing district; the truth of the matter is that none of us had realized it until the wonderful success had been achieved. Ontario had been represented as a good place for skating and tobogganing, but it was not supposed that it could compete with the great States of the Union, such as California and Florida, in fruit growing; but it is proven that even in that respect we can surpass the Americans. (Hear, hear.) He had been delighted with the meeting thus far, and surprised at the extent and variety of the discussions. They had disposed of mice and vermin of all kinds in connection with the fruit trees; they had disposed of the potato bug and the bee; but there was one subject that they seemed to struggle with in vain, and that was the truthless tree agent. (Laughter.) He seemed to stagger them all. Here was a great field for missionary enterprise. (Laughter.) He concluded by thanking the College authorities for their generous entertainment.

Hon. John Dryden was next introduced as Minister of Agriculture and a Governor of McMaster University, of which Woodstock College is an academic department for young men. He spoke favorably of the institution and eloquently advocated a liberal education for farmers' sons. In his opinion there was nothing in a true education that should drive men or women away from industrial pursuits.

Messrs. M. Pettit, W. E. Wellington and Prof. Saunders also spoke along similar lines. After a chorus by the college boys, the delegates repaired to the Town Hall for the afternoon session.

SECOND DAY—AFTERNOON SESSION.

Convention resumed at 2.30 p.m., Mr. A. H. Pettit being asked to take the chair.

QUESTION DRAWER.

Question: What four varieties of peaches would you recommend for this locality?

Mr. J. W. SMITH: Considering it a cold locality, pretty high, I would recommend Early Rivers as the best early peach and Hill's Chili for a later peach. Probably the next best would be Garfield; with us it has done better than Early Crawford. I would name Crosby for the last one; it comes in about the time of the late Crawford; it is a smallish peach and good flavor.

Question: In planting an assortment of two hundred young apple trees what kind would you recommend and how many of each variety, local and foreign markets considered?

Mr. DEMPSEY: I would put in about twenty Duchess, about twenty Wealthy, about twenty Gravensteins; the balance I would equally divide with the Ontario, Ben Davis and Stark.

The SECRETARY: Is the Stark an abundant bearer?

Mr. DEMPSEY: Yes.

The SECRETARY : Is it a good shipper and seller ?

Mr. DEMPSEY : Yes ; it has a better flavor than the Ben Davis, I think, and keeps fully as well.

The SECRETARY : What about the Ontario ?

Mr. DEMPSEY : The Ontario bears so heavy it is very apt to run a little small without thinning the fruit.

The SECRETARY : Is it subject to scab ?

Mr. DEMPSEY : I have never seen any scab on them.

Mr. RICE : Is the Ontario a seedling of the Spy ?

Mr. DEMPSEY : It is one of Charles Arnold's seedlings, of Paris—a cross between the Wagener and the Spy. It has the bearing qualities of the Wagener ; it is more acid than the Spy and keeps fully as well.

The SECRETARY : In this connection I would mention the Cranberry Pippin, which for southern Ontario is a very good market apple. It is of ordinary quality, but it is a showy apple and a good bearer, and it has borne heavy crops when many other varieties did not bear. Even the Baldwin failed to produce, and this apple produced freely ; that is why I thought a good deal of it.

Mr. CASTON : I would like to draw attention to an apple from the eastern end of the province called the Fallawater. In the county of Simcoe it is a perfectly healthy tree, an abundant bearer and clear of fungus scab. It is a handsome apple. It was quoted in Liverpool this fall at 17s. a barrel. It is firm fruit, good shipper and good cooker.

Mr. RACE : It has no quality.

Mr. McNEILL : 17s. is the quality.

Mr. RACE : They will give that until they find out what it is.

Mr. DEMPSEY : My experience is that I can grow more Baldwins than Fallawaters. The latter drops prematurely with me.

Mr. SHERRINGTON : The Fallawater is not an annual bearer with us ; only about once in two years we get a crop. It is really a fine apple, but I do not consider the quality equal to our other winter apples. In cooking it does not fall down like the Spy, Baldwins, Greenings ; it will be about the same as the Ben Davis, and its season with us is about the end of March.

The SECRETARY : I think it will be best that the balance of the questions be referred to a committee, as they are of such a nature that they would occupy the whole afternoon in discussion. They go into great detail with regard to the best varieties of every sort of fruit and the best methods of planting them. Many of these points were brought out in yesterday's papers and discussions.

SPRAYING AND THE CULTIVATION OF ORCHARDS.

Mr. J. C. HARRIS, of Ingersoll, read the following paper :

I am here to-day with the desire to listen to your discussions and to gain information on questions with which you are much more familiar than myself, rather than with the expectation of giving you any instruction. The topic before us, "The spraying and Cultivation of Apple Orchards," is an important one. I do not purpose in this paper to go into details, but rather to give a few general points apt to be overlooked by the amateurs. First, let us look at a few causes why apple culture is not more generally successful. A tree when young, like an animal should always be kept growing, and how best can we accomplish this ? After having our orchards well set out, having due regard to location, drainage and richness of soil, the surface earth about the tree should be kept stirred once every two weeks or oftener, especially in very dry weather. I consider this

superior to either mulching or watering, and have seen young apple trees first year planted treated in this way make two feet in one season. If one has not the time for this I consider mulching next best. But for the healthfulness and vigor of the tree I consider the former practice much superior, especially the first season, as it keeps the soil moist during the severest drouth, and also allows the sun's action upon the soil, while mulching only serves to keep the soil moist. This practice also of shallow cultivation adds materially to the size and quality of the apple after the tree comes into bearing. We occasionally see productive orchards standing in sod. This only proves the land is unusually rich ; as a rule this is not the case. Seeding down an orchard for a few years in some cases may prove beneficial, but the majority of orchards contradict this experience. Cultivation should begin in the spring as soon as the ground is fit for work and discontinued in August to give the tree time to mature its wood before the coming hard frosts.

Another most important point to be considered, what shall we feed our trees? The question of what the orchards require to form wood, leaves and fruit is one for us to study. We are told the ash of fruits contains from fifty to seventy-five per cent. of potash and only a small proportion of other ingredients, which certainly proves that potash is the principal one taken from the soil by our various fruit crops. Unleached wood ashes contain a very large percentage of potash, we are told from twelve to fifteen cents' worth in a bushel, beside from six to ten cents' worth of other ingredients. Therefore if we can purchase these at from nine to twelve cents per bushel I do not think we can get a cheaper fertilizer for our orchards. Stable manure, where available, applied in combination with the ashes would certainly prove beneficial, but should be withheld if there proves to be too much wood growth at the expense of fruit. If we neglect to feed our trees we must come to the conclusion apple growing does not pay. Another point we will look into is pruning. The tree should be kept symmetrical and open from its youth, never allow a year to pass without performing this important operation, which will prevent the need of removing any large limbs which is certainly detrimental to the tree's welfare. Boots made from some soft material such as rubber should be worn while pruning, not to loosen or remove any bark from the limbs by standing upon them.

Be very careful to encourage and protect fruit spurs when pruning and also picking. These little twigs or spurs along the limbs is just where we find some of our choicest fruit. Some time ago an old man who has made a business of pruning for many years in our locality came into my orchard and asked for a job of pruning. So I thought it a chance perhaps of getting some new idea on the subject. He took the saw and commenced cleaning the limbs of all their fruit spurs. I can assure you he did not continue very long. I know of no better way of encouraging the growth of these fruit spurs than shallow cultivation and the use of wood ashes, and I think as a rule a tree filled with these spurs will before long be filled with fruit. I will here give you my experience in spraying in 1894. The May frosts ruined the crop of 1895. Having had but the one season's experience my practical knowledge is but limited. However, I can say with me it has proven a decided success for the prevention of apple spot or apple scab, and the destruction of the codling moth. How often the failure of the crop of apples or pears is laid at the door of the weather clerk when if a close examination had been made the presence of fungi or insects sapping away the plant life would have been discovered, and a timely application of the various methods of prevention and remedy now known would save a large proportion of our product from their attacks.

First let us consider the various remedies which have proven the most effective and practical in our warfare against these diseases and insect pests. The Bordeaux mixture, composed of copper sulphate six pounds, quicklime four pounds, water fifty gallons, is the one most commonly used, and has proved very effectual in preventing the black spot or apple scab.

Paris green or London purple, in the proportion of a quarter of a pound to fifty gallons of water, or in the same quantity of the Bordeaux mixture, has been found sufficient to destroy the codling moth or tent caterpillar. Paris green is entirely insoluble in water, hence, in its application, some means must be resorted to in order to keep the mixture

well stirred. I will here give you as near as possible the percentage of marketable fruit gathered from three different orchards, each having had a different number of the above remedies.

No 1 is a young orchard sprayed five times which turned out an abundant yield of nearly perfect fruit, not over five per cent. being unmarketable. First application just as buds began to swell: Six pounds copper sulphate, fifty gallons of water. Second application just before blossoms opened: Bordeaux mixture and London purple. Third application just before blossoms fell, with the same. Fourth a fortnight later, same. Fifth three weeks latter, same.

Orchard No. 2 was treated same as No. 1, with the omission of first application of copper sulphate. The results from this orchard were considerably behind the first one, although about the finest crop I ever had.

Orchard No. 3 was sprayed twice, once before blossoms opened and once just after they had fallen, with the same mixture as the others. I consider this one paid handsomely for the outlay, although there was probably twenty or twenty-five per cent. unmarketable. I do not feel justified in saying the difference in orchards, No. 1 and 2, was wholly due to the first application of copper sulphate; orchard No. 1 being much younger and not containing Spys or other kinds most liable to be affected by scab, had much to do with it. However, in my opinion the application before blossoms opened is of fully as much value and possibly more than the subsequent ones in preventing these fungous diseases. Again, orchard No. 3 had the two and three applications and was comparatively free from scab, but was seriously affected with codling moth. Now what do we naturally gather from reviewing the results of the different number of applications in the three different orchards.

First, that the first application before blossoms opened is of fully more importance for the prevention of fungous diseases than the later ones; also that it requires a series of applications of insecticides to successfully cope with the codling moth. I might say just here, in orchard No. 2 a few Spy trees were sprayed on one side only. The other side, which was more favorably exposed to sun and air, had scarcely a marketable specimen on it. The side treated was laden with beautiful fruit.

As to the preparing of the Bordeaux mixture: Have one large barrel for the copper sulphate, another for the lime, put in a coarse sack the number of pounds of copper sulphate you wish to dissolve; suspend it in barrel No. 1, containing half the number of gallons of water that you have pounds of copper sulphate. If any remains dissolve it in some hot water. Then every gallon of the mixture contains just two pounds of copper sulphate, which makes it in a convenient form for use. Fresh lime should be slacked, strained through a fine sieve and a No. 2 barrel filled with it in such a proportion that every gallon contains just two pounds of lime. This is easily done by weighing the lime before slacking, and using one-half the number of gallons of water there are pounds of lime in slacking it. Now take three gallons of copper sulphate from barrel No. 1 and two gallons of lime from barrel No. 2 and put them in the barrel we use for spraying; fill up with forty-five gallons of water, mix well and our Bordeaux mixture is ready for use. Add four ounces of Paris green or London purple for destruction of codling moth. I might add that for spraying high trees, use a ladder made of two by four scantling, fourteen feet long, fastened to back end of spraying waggon. A man getting on the top of this ladder can do the work almost perfectly, and much more easily than by holding the nozzle on the end of a long pole or rod, as is sometimes recommended.

In conclusion, I will mention some of the most important points to be remembered in spraying:

1. Have a good outfit with not less than eighteen feet of hose to reach the top of ladder for treating very high trees.
2. Keep the liquid well stirred or your efforts will be fruitless.
3. Be sure and start in time. Do not wait for the weather. I will here relate a little circumstance which occurred the past season: I sprayed some red currant bushes before a very heavy, dashing thunderstorm. I could not find a currant worm on the

bushes the rest of the season. About a rod from these was a few gooseberry bushes unsprayed; the worms ate every leaf from them. The Bordeaux remained on bushes for three months.

4. Be sure your lime is fresh, and put in fully four pounds.

5. Get formula for Bordeaux mixture from a reliable source. Do not depend on the circular you get with your pump; some of them are worse than useless.

6. Remember the June spraying, just after blossoms fall, is the most important for the destruction of the codling moth, and do it thoroughly.

Spraying may not protect against all the effects of a late frost or a long, continuous rain, but it helps. Anything that strengthens a tree or plant in one direction increases its resistant powers in another. There are other ways in which the results are beneficial besides those mentioned.

The leaves of our trees when affected by the scab fall prematurely, carrying with them much potash, a potash acid, a direct loss to the strength of the tree. Now, if the leaves can be made by spraying to hold fast until the proper time for maturity of growth their fertilizing constituents will be withdrawn from the leaves into the body of the tree, and there be stored up for the following year.

EXPERIMENTS IN SPRAYING IN 1895.

Mr. A. H. PETTIT said: I have been conducting the spraying experiments throughout the province during the past season, and was waiting to get the final returns, and make a report that will be satisfactory and which will be published in some of our reports. I can simply now give you a synopsis of the work we have done, and the results. The first intimation we had of this work was through the Honorable the Minister of Agriculture. It appeared to him that some good work could be done throughout the province to assist the fruit growers, by sending out three spraying outfits, so that our fruit growers might see the work in operation and also the results at the close of the season. The work was entrusted to me, and our plan of operation was to touch those centres of fruit culture where a large number of people could have an opportunity of seeing the work during its progress, and of noting the results. One of our drawbacks was the peculiarity of the season. As many of you know, we jumped as it were from winter weather to warm summer weather, hastening the budding and blossoming of the fruit. In covering so wide a territory the work had to be done at the exact moment, in order that we should not be too late at the other end of the route which each outfit had to take. We commenced in the county of Essex and went through to the county of Welland, visiting ten points; then we commenced in the county of Lambton and round the Georgian Bay district to the county of York, Newmarket, as a second division, ten places; then we commenced at Whitby, in the county of Ontario, through as far as Cornwall and the county of Dundas in the east, ten places. Three outfits travelled that territory throughout the season, covering it in every case in twelve, and in one case I think, thirteen days for each round. Now this spraying experiment was thoroughly, practically and fully done as laid down in the bulletins or our Agricultural College and of the Experiment Station at Ottawa. It was simply carrying out what they stated would destroy the fungi and prevent the codling moth from injuring our fruit to any extent. I purchased the best quality of copper sulphate that could be got in the country. It was all in one cask, and it was all weighed from that cask for the whole territory. The Paris green was dealt with in the same manner. It was of the best quality we could get, and was weighed by the druggist in four ounce packages, just the quantity we intended to use each time; and that also covered the whole experiment, so that it was not using a little Paris green here and a little of another brand there, a little less quantity here and a little more quantity there, but we carried out the experiment exactly as laid down in these bulletins. In going through the territory early in the season to make the necessary arrangements I was exceedingly pleased with the enthusiasm and satisfaction with which I was received

by the fruit growers of those district. In many instances we had no less than 100 people present to co-operate in carrying out this work. The work was thoroughly done. We have a large number of pump manufacturers in our country who are manufacturing spraying pumps. I asked them if they were prepared to supply pumps to the various points throughout the province. They said they were, and that they had excellent spraying pumps. I then told them that I wished them to prove to me that they had spraying pumps that would do this work thoroughly and well, and in order to convince myself of that I asked them to bring those pumps to my own place and give a practical demonstration. They brought their pumps. I furnished them with fifty gallons of the Bordeaux mixture, and told them that the mixture had to be applied evenly and thoroughly to the tree; that would test not only the pump but the nozzle, and test the excellence of the pump as to agitation. "You must keep the liquid thoroughly agitated" I said "during the whole work; unless you do so the work can never be done perfectly." They brought their pumps and the mixture was applied; and then I wished to draw their attention to a little dinner or something of that kind in order to allow the sun to dry the spray on the trees, and afterward I invited them back to the orchard to see the work their pumps had done. The first four or five trees were thoroughly covered with the lime of the Bordeaux mixture, but later on there was no show. Now, I believe that was the first time some of our pump manufacturers realized what the real work was which their pumps had to do. I said that must not be; there must be more agitation. Now since that time those gentlemen have improved on those pumps till I believe we have in the province of Ontario as good spraying pumps as can be found manufactured in the world. (Hear, hear and applause).

It was simply that they should know what their pumps were actually capable of doing. There is no use of our deceiving ourselves by putting this liquid into a barrel, allowing it to settle to the bottom, pumping it out in a round stream like that with a "Boss" nozzle, letting it all run off the trees, and then in the fall of the year saying "I don't see the results of the work that was done." It must be evenly applied, covering it like the dew, so that every part and parcel of the tree would be covered with this mixture. It must be done at the proper time and in a thorough manner. I think you will all appreciate the great advantage it would be for all our fruit growers to carry it out on that line. We commenced on the 24th of April and we finished on the 20th of July. We gave six applications at each point. When we got to the other end we immediately come back to where we began and passed over again—the ten points covering ten days, the only hindrance being two Sundays and holidays, except at the time of the third application, when I called my assistants in for two days for fear the blossoms had not fully matured and were not falling sufficiently from the trees, lest our bee men might have complained that we were pushing the matter rather hastily. At the end of the season I visited each and every one of those points. What result did I find? In some sections of the country where the frost was very severe just at the time that the blossom was fully out and immediately following a drouth our results are not so marked as I would like to see, though we had some results even in those cases. We have got the best of results throughout the whole territory except in two or three points. Now, in what line is that best result shown? First, it is shown in the healthy appearance of the foliage—foliage more vigorous, and we all know what that means in a fruit tree; if we have vigor in the tree and good healthy foliage we may expect good fruit buds to set, and we may expect possibly better results from the work of the next year than we would have this. The next point was in the cleanness and the perfectness of the specimens of apples. At nearly every point that I inspected you can see an increase in size, cleanness of specimens, and in many cases much larger crop than where the trees were not sprayed. You all know that this year the frost and the drouth continuing had its effect in many ways; and I believe that the frost assisted in destroying the fungi as well as insect enemies, and for that reason the difference between the unsprayed and sprayed was not so marked as it would have been in almost any season during the last ten years. Throughout the season I kept and had the experimenters keep a book in which certain questions were asked, and they had to fill them out each day. These were, the condition of the orchard, the solution applied, the weather on the day of the application, and the general

appearance each day they visited and did their work, not only of the trees that were sprayed but of the trees that were unsprayed. The solution was applied in fair weather, no rains to wash it off, and we should have had the full results of that experiment. I want to offer one suggestion, and I think every one will agree with it, although we have been doing it the other way. It is supposed that our first application should be the copper sulphate solution only—four, five or six pound as the case may be. I notice some of the bulletins claim it is better to use six, and some four, but I used four throughout this work. Now I would suggest that every solution in the future on the apple—I won't say other fruits—should be the full Bordeaux mixture, because in many parts of our province our people are being troubled more or less by the bud moth, and it would be an advantage if we could prevent the bud moth by using the Bordeaux mixture in the first application. The second reason is that the Bordeaux mixture will not hinder the work of the copper sulphate; it will do its work just as well as if it was applied alone. We can also destroy any other insects that might be injurious to the tree during the application. The only addition would be the slight cost of the lime and Paris green; it will be a trifling matter in comparison with the good work it might do.

Mr. McNEILL: Do you mean the Bordeaux mixture or do you mean the Paris green with the sulphate of copper?

Mr. PETTIT: I mean the full Bordeaux mixture—a little of the copper sulphate with the addition of the Paris green; that the full application should be given every time.

Mr. CASTON: That is to bare trees?

Mr. PETTIT: To the trees from start to finish.

Mr. McNEILL: To the dormant wood?

Mr. PETTIT: Yes. The lime will fasten the Paris green and copper sulphate to the tree, and that may destroy the bud moth at the start. I would like to say a word on another subject—the question of cultivation. I have travelled over this province several times, and have been a fruit grower all my life, and I have observed marked results that follow good cultivation. I believe in ninety-nine cases out of a hundred the man who plants his orchard with good judgment in selecting varieties, and cultivates it well, and has heart in the work, will succeed and make it pay well. I won't say there is no instance where a man has never cultivated his orchard and yet had good crops; but the man who cultivates his corn or any other crop is the man who will profit by the business, and he is a credit to his country. Unless we cultivate, prune and handle our orchards in that way we never can get perfect specimens of fruit. I have brought these two apples up to illustrate what I mean. Unless the tree is well grown and thoroughly pruned, so that the sunlight of heaven can get in, you cannot have the quality and the color in your fruit. Here is an apple that has the quality, and that will bring you money every day, while this other is an apple that will neither be a first-class keeper nor have the quality. It cannot have quality without the color. (Mr. Pettit exhibited two Northern Spy apples, one of a very high color and the other very dull, as proofs of his argument). Another point we need to find out when we go to plant an orchard is: Where is the home of that apple? I find in the northern sections of our country apples of a high keeping quality and producing abundantly. Why is it? Simply because it is the home of that apple. If we can locate a variety in its right place that is the variety we should plant, and the one that will be successful. I am frequently asked to recommend varieties for certain localities. I think a man in that locality should visit the orchards in his neighborhood, study the question himself, the soil and climatic conditions, and plant that which will be hardy, and he will not go astray. At these annual meetings we have an opportunity to study and exhibit and show and explain. You get the views of all the different sections of the province. I always think there is most excellent reading between the lines, and we want to do that as well as reading along the lines. One more word about this pump question: I am asked a thousand times which pump I would recommend after having used five manufacturers' pumps. Now, gentlemen, I will tell you what you want in a pump: You want a pump

with plenty of power ; you want a thoroughly good nozzle, one that will apply this mixture in a fine spray to your trees, and a first-class agitator ; and when you have got these never mind who is the manufacturer ; if he furnishes these you have got a good pump, and as far as capabilities go you are as well able to judge that as I am. I would say this to the manufacturers : Don't be trying to manufacture a cheap and nasty pump, because you will do more injury to our cause than otherwise you could do. When a man goes to spray in a busy time and his pump gives out, it discourages him, and it ends in disaster all around. I say to the manufacturers : Manufacture a first-class article, the best you can make, and I believe our fruit growers as a whole will be better satisfied with it than if they got one for fifty cents.

The PRESIDENT : The subjects that have been presented to you in the paper and in discussion, are before you. I shall ask Prof. Craig to open the discussion.

Prof. CRAIG : It afforded me a great deal of pleasure last year when I was made aware of the proposed action of the Provincial Government through the Minister of Agriculture with regard to the carrying on of spraying experiments which had been started during the previous year, and I was especially gratified to know that such an admirable selection had been made in the man who was to do it. After the magnificent success which Ontario achieved at the World's Fair under his oversight there was not much difficulty in making a choice of the man who has carried this work on to successful completion, and after the report we have from Mr. Pettit to-day I think that choice was perfectly justifiable. Last summer in a trip through the western part of the province, I visited with Mr. Pettit some of the stations at which he carried on his work, and I wish to corroborate in a general way the results he has stated. I found in Essex County in the orchards treated, the insect depredations were very much lessened and the quality of the fruit very much improved. We had excellent opportunities for observing these points, because in nearly every case there were orchards alongside that had not been treated, and also in the same orchard some of the trees were not sprayed. The work was carried out on a perfectly practical basis, and in a way to give definite results. In regard to the formula used I don't think it is necessary for us to use more copper sulphate than the results of our experiments in the past, show to be needful. We have very conclusive results to show us that four pounds of copper sulphate and the same amount of lime are as effectual as using more, which only increases the expense. I wish to pay a tribute to Mr. Harris' paper, for it showed the result of careful individual research, and that is what we need not only on the part of the experimenters, but of individual fruit growers throughout the country, who can by the result of these practical experiments strengthen the hands of special investigators who are appointed for the purpose. After my experience in spraying for five years I don't think it necessary to use a stronger formula than that used by Mr. Pettit in his work during the past season, and that which is recommended by both Guelph College and the Experimental Farm at Ottawa, viz., four pounds of copper sulphate and four pounds of lime ; and when we add four ounces of Paris green, to a barrel of water, about forty gallons, we have a formula easily remembered and very efficient.

Mr. SMITH : Would you agree with Mr. Pettit in recommending a full application ?

Prof. CRAIG : The copper sulphate as the first application was recommended with a view of destroying the apple spot only, and it was recommended because it was more easily applied and was much cheaper than the Bordeaux mixture. At that time we did not have in mind the destruction of this very injurious pest, the bud moth, which has been spreading over the province, and which is annually becoming more destructive ; and I quite agree with Mr. Pettit that with the view of destroying that insect and other insects, such as the cigar-shaped case bearer, the Bordeaux mixture with the addition of Paris green for a first application would be more satisfactory. It is really the same amount of copper sulphate, because we use four pounds to fifty gallons in one case and two pounds to twenty-five gallons in the other ; it is only the addition of the lime and the additional inconvenience of applying it.

Mr. BEADLE : Lime makes it adhere a great deal better.

Prof. CRAIG : Yes, and everyone who has used lime in destroying fungous pests where the same attack plants will find it exceedingly useful. It may interest you to see a photograph which I took of a spraying apparatus which I have used at the Ottawa Farm, and which is especially useful in orchards where the trees are rather close together. It is simply a barrel set in an ordinary dump cart, and the barrel is stood on end, and the cart is floored over on a level with the top. That floor holds the barrel in place, and also gives the man a platform to stand upon who is operating the spraying. (Photograph exhibited.) In connection with the experiments for the prevention of disease which effect our grape vine, I have a couple of photographs which represent two vines of the same variety in the Experimental Farm at Ottawa ; one which was sprayed for the prevention of a disease which we know as the "bird's-eye spot," and the other which was not sprayed. In one case the foliage is so dense that you cannot see the fruit ; in the other case the vines are entirely defoliated, and what little fruit still remains can be plainly seen. These little object lessons I leave in the vineyard for the benefit of visitors, and they are often more conclusive than any feeble words which I may be able to offer. I am exceedingly pleased to see the active steps which the Provincial Government have taken in this matter, and the practical manner in which the man who has charge of it has carried it out.

Mr. PETTIT : I want to tell you how that wonderful work at the World's Fair was accomplished, for the glory does not all rest on my shoulders by any means. The satisfactory result was achieved by the patriotic assistance of the fruit growers of the Province of Ontario placing in my hands fruits that the judges who were appointed had to score as they did, and that is the way you got the rewards, and not all through my efforts in the matter. I thank you for your flattering remarks, but they were getting a little too thick. (Laughter and applause.)

Mr. W. E. SAUNDERS (London) : Bordeaux mixture has been recommended with the addition of Paris green, for the destruction of the bud moth. Of course Paris green destroys the bud moth. Why should not sulphate of copper, the solution of which is more easily applied, and which perhaps is more active in destroying the fungus spores as they lie on the tree, be added to the Paris green instead of the Bordeaux mixture ?

Prof. CRAIG : Mr. Pettit's idea in recommending the Bordeaux mixture was that, with the addition of lime, you have the Paris green on the trees for a longer time. The copper sulphate, I suppose, being in a dissolved form when it is put on, is therefore the more readily washed off ; and it would be natural to suppose that the Paris green would be washed off with it more readily than if it was plastered on, as it would be more or less when applied with the lime instead of the Bordeaux mixture. The idea is to hold the poison there for a longer period, and in more effective form than you can when applied with the copper sulphate. There is no objection, when the trees are dormant, to applying the Paris green with the copper sulphate solution.

A DELEGATE : I would like to ask Prof. Craig a question. I am not well posted at all in the black knot and those other things in regard to the spores floating in the atmosphere from tree to tree. Do you not think, if we could have the Bordeaux mixture fastened upon the wood and branches early in the season, it would destroy those spores that float and lodge upon our trees before they could penetrate the wood and create what we call the black knot ?

Prof. CRAIG : Some experiments have been carried on in preventing the black knot by spraying with Bordeaux mixture. At Ottawa we are surrounded by such remarkably favorable environments that black knot has not yet attacked us, though I found the other day a specimen, and I thought perhaps, with careful treatment, I might be able to produce some from this. (Laughter.) Prof. Lodeman, of the Cornell University, began some experiments for the prevention of black knot by spraying with the Bordeaux mixture, and they showed that there was reason to hope that we could successfully deter the growth and multiplication of the black knot by spraying. Of course he sprayed the tree at that period when the spores are being most actively disseminated ; those periods being usually the months of June and March. He gave his trees several applications, but the

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

results were not so conclusive that he could say that it would pay, although he could say that it did prevent it. The question of pay could be successfully demonstrated only by experimenting on a larger scale.

Mr. McNEILL : I have no hesitation in saying, after some years of experience, that spraying is an undoubted and positive cure to a very large extent—fully as large as has been testified to here—of these fungous and insect enemies.

Mr. CASTON : The law which requires branches affected by black knot to be destroyed is, in many cases, a dead letter because not enforced, and unfortunately you will find a great many hedges that are literally breeding-grounds for black knot, the spores being carried in the wind. There will be no immunity as long as these hedges exist.

Mr. M. PETTIT : Since the Act has been amended and made more workable it has been rigorously enforced for two years in our township. Black knot was spreading to an alarming extent, and now scarcely a vestige of it is to be seen. I believe it could be entirely wiped out.

Mr. PEART : We asked the township of Nelson to appoint an inspector, under the provisions of the Act, over a year ago. They appointed two inspectors, one for the northern half of the township, and another for the southern half. It has had a remarkably good effect. Wagon loads upon wagon loads of cherry trees affected with black knot have been cut down and burnt, and I think I may safely say that at least seventy-five per cent. of the black knot of the township has been wiped out.

Mr. M. PETTIT : Simply cutting off the affected branches is not sufficient ; letting them lie on the ground is just about as bad as letting them stand ; they must be burnt.

Mr. ORR : Before the inspectors were appointed in our township, cherry trees were loaded with black knot, and every plum orchard, as far as I know, was seriously affected. I was going through my plum orchard, of fourteen hundred trees, the other day, and I found but one tree affected, and that is on the trunk, and we are treating it with coal oil to save the tree. We have succeeded in saving every tree.

Mr. TURNER : I can speak for the St. Lawrence district, that a mere glance shows a difference in the foliage between the sprayed and unsprayed trees at the points visited by Mr. Pettit. The sprayed trees were interspersed throughout the orchard, just an odd tree here and there, which gave a very severe test. The results in the fruit were also very satisfactory indeed. I regret that Mr. Pettit did not speak in regard to the pruning and care of fruit trees which he had observed in his travels.

Mr. RICE : I once had a pear tree, one limb of which did not bear for several years, and one limb was bearing. In watching for the cause I found that a little grape-vine had got a tendril around that limb and cut into it and caused that limb to produce four or five pears—at least these were the only pears on the tree, and I judge that was the cause of it.

Mr. WM. GRAY, a veteran fruit grower in this locality, being called upon by the President, said : I am very much pleased to see the improvement that has been made in these gatherings. I remember that at the meeting of this Association in this hall some twelve years ago we had perhaps about two dozen. I think our Governments have acted very wisely in establishing these experimental farms ; I think it is one of the most beneficial acts they have ever done. I think there is nothing that improves a country and people like horticulture and farming interests. I wish that every person in the province would take the *Canadian Horticulturist* ; any one issue is worth to the people ten times the amount they pay for it. I have taken it from its first issue, and would always recommend it. It is required as much in the farm as in the garden.

The PRESIDENT : We have with us the Honorable the Minister of Agriculture, and as he is obliged to leave on the next train, and as we are anxious to hear something from him, I will now ask him to address you.

PRESENT DAY REQUIREMENTS OF OUR FRUIT TRADE.

Hon. Mr. DRYDEN said: I desire to congratulate the members of the Ontario Fruit Growers' Association on the energy they are displaying in the prosecution of the work for which this Association is organized. I shall not be speaking offensively of the past when I say that in my judgment you are renewing your youth, and now occupy a more prominent place in the minds of the people than at any time in your past history. I am very glad that such is the case, for at no time in the history of the province has there been so much need for activity along this line. The depressed condition of many departments of agriculture is forcing our people to consider what particular branch they may turn their attention to with any considerable profit. Just now there is no branch that is more attractive and presents greater possibilities than that of fruit growing. It has become clear that certain portions of this province are peculiarly fitted for the production of the finest fruit. Some localities are specially adapted for the production of plums; others, while not being equal in this direction, are found admirably adapted for the production of the finest apples. In some sections of the province the very finest quality of peaches can easily be produced, while in almost every section smaller fruits grow in great luxuriance. Some idea of the immense trade in fruit may be had from a glance at the photographs Prof. Craig has just shown me—one representing Winona station before the train arrives, and the other taken after the arrival of the train. Such a volume of business at one station indicates the enormous value of the whole industry throughout the province.

By those unfamiliar with fruit growing, who have in the past been engaged largely in other directions, and who desire to commence this industry, the very first thing needed is definite and reliable information. Naturally they look to an association of this kind, in whose ranks are found the oldest and most experienced fruit growers, to supply this need. May I remind you that it is in order that you may be conditioned to accomplish this that the Legislature gives you your annual grant. It is not merely that you may help each other, which is in itself commendable, but that through you the masses of our farmers may be educated along this line. Of late years my Department has multiplied the information annually given to the public in reference to various agricultural products, and we have also multiplied the constituency of readers who await the annual issue of each report. I am glad to tell you on this occasion that none of these reports are more eagerly sought for than that which comes through the efforts of this Association.

To make a success of any calling it is self-evident that knowledge of its requirements is the first requisite. No one would think of opening out a large mercantile establishment without some previous knowledge of the business. We do not allow a physician to practice unless by previous examination he furnishes a guarantee of proper equipment. No teacher can get a position in any of the schools of the country without such a preparation as is required by the Department. While this is acknowledged to be right, there have been in the past too many who believed that no previous knowledge was necessary in agricultural pursuits. By bitter experience many have discovered that the same principle holds here as in other callings; ignorance means certain failure, while knowledge leads to success. We provide free schools to fit professional men for their callings, the wisdom of which all classes acknowledge; and I affirm that one of the legitimate functions of the Government is to give to the people in addition to the knowledge they require in order to fit them to do their best in agricultural pursuits.

Your business naturally divides itself into two parts—first, the knowledge necessary for the best production, and, second, that which is requisite to place the results of your labors on the market in the best possible condition. If we take the larger fruits—and I presume the same statement will hold good in reference to those that are smaller—the first thing concerning which the beginner will require information is as to the best varieties and those likely to be most successful in his particular locality. I am free to confess that this has been, and perhaps is now, a very difficult question to answer. I

have given some attention to the subject, and yet I have not definitely made up my mind as to what I should say to a beginner if he came to me seeking advice in this regard. There are some who would give him a name of a variety or varieties which they are willing to confess are somewhat inferior, but which they claim are at present in demand, because of its color or size. I have some doubts as to whether such advice ought to be accepted. The inferior apple will in the end be rejected by the market, no matter what its color; it needs only to be placed alongside of something that is superior, and the latter will inevitably take its place. Because such a variety at the present moment attracts attention on account of its exterior appearance is no reason why ten years from now that variety will hold its place on the market. I take the same ground in the production of fruit as I do in the production of every other agricultural product, and I should like to say here that my belief is that more than ever the future will show that the article which has *intrinsic merit* will in the long run win. To advise a man to-day to plant a tree that produces finely colored fruit, but which is of itself of little value, is to lead him into a quagmire of disappointment.

When a beginner asks for information on this point there are several things that he must consider: First, will the variety, however valuable it may be, stand his climate; second, is it such a variety as is suitable for his soil; third, will it commence to bear during its early life, or must he wait ten or fifteen years before he can reap the fruit of his labors; fourth, is the variety a good bearing variety; and fifth, does it bear annually or only every other year. All these things ought to be taken into consideration in addition to the question as to whether the fruit contains in itself the points of excellence sought for in the best markets.

What I have said in reference to apples would, I presume, be equally true with reference to any other fruit. Now, it was in order to obviate this difficulty and to afford the information I have suggested, that my Department recommended to the Legislature the establishment of the fruit experiment stations that are now organized in different portions of the province. Some of us have found by bitter experience that the recommendation of a fruit grower in the Niagara district as to variety cannot be considered reliable when put into practice in some of the other districts of the province; the tree may be too tender, the soil may be unsuitable, etc. These experiment stations will give an opportunity to the beginner who desires information to go and examine for himself, and to ask the necessary questions of one who is authorized and conditioned to speak accurately in reference to the matter. Although we may not see the results of the establishment of these stations in the immediate future, those who live in the years beyond will find that this work will have borne abundant fruit to the advantage of fruit growers generally.

Having selected his variety, the next thing concerning which the beginner desires knowledge is as to proper cultivation. One difficulty I find in taking advantage of the knowledge that members of an association such as this have to offer is that they do not take into account that there are hundreds of people who are entirely without information as to how to proceed. So many things are taken for granted and not mentioned, but which should be if the beginner is to have the advantage of the experience of those who are older. It is quite possible for me to give you directions as to the erection of a silo and yet leave out two or three little items, which will probably not be noticed by the beginner, but which will lead to the entire failure of the whole concern. I am afraid that even the members of this Association do not fully understand the dense ignorance that prevails in many quarters in reference to the details connected with fruit culture. Information is needed how to plant, how to prune and how to cultivate generally. It is said that "eternal vigilance is the price of liberty," and with equal truth it may be declared that eternal vigilance is the price that must be paid for superior fruit.

One of the special things in cultivation which will demand the attention of all fruit growers in the future is that which has occupied a considerable portion of your time in the discussions that have taken place at this meeting; I refer to the necessity for spraying in order to produce the very best results. In mentioning this matter, I do not speak

of it in any guessing sort of way. I have arrived at that position when I am prepared to say that in some portions of the country those who refuse to attend to this matter will be unable to secure the best results. Men observe their trees looking unhealthy, they observe the leaves looking different to what they did in former years, but they never dream that this is owing to some disease they can correct by means of a spraying pump. This information must be given to the people, it means thousands of dollars of revenue to the country, because without it the fruit will be inferior and irregular and more or less unsalable; with it we shall be able to keep the trees healthy, the foliage full and clean and the fruit without spot or blemish.

We have done something in this direction already by sending through some of the counties a spraying outfit, showing how the work should be done. We have published bulletins giving full information as to the proper time for spraying and the ingredients of the various mixtures, but we have reached only a small percentage of the people interested. This work must be vigorously prosecuted in the future until all have had an opportunity to take advantage of our instruction. What, I ask, has placed our cheese ahead of all others? I answer, instruction of the people, and I assert that similar education will yet place our fruit in the same enviable place.

I am looking forward to the day when the fruit, especially of the Province of Ontario, will be sent to its best market in Great Britain in such a condition as to command the admiration of the Englishman; and when we have done that we shall have no difficulty in maintaining our hold upon the market. Depend upon it that in that market the best and best only will win the first place. It is largely with the Englishman a matter of confidence; once establish the fact that Canadian apples are the best, and that they are honestly placed upon the market, and they will command the price which their quality will warrant.

In educational matters we are wont to say to the young man just starting out: "Do your best and remember there is plenty of room at the top, while you will find the lower rounds of the ladder very much overcrowded." The same thing is true in reference to agricultural products: there is room in the best markets if we can attain the topmost round of the ladder. I have courage enough to say to this meeting now, that with the education we have given, and which we propose to give to the people in the future, we *shall attain this place.* (Applause.)

It will soon be manifest to everyone, whether he be educated or otherwise, that there is no money in producing fruit that can be stamped only as third class. The money has been made in the past, and will be made in the future, by those who pay such care and attention to cultivation as will enable them to produce the very best quality. This is the doctrine I am preaching everywhere, and I propose to continue to do so, for although other political nostrums are proposed labelled "N. P.," "P. I.," "P. P. A.," etc., each of which is to bring peace, joy and prosperity, wealth will only come by the improved production of such articles as the world needs. Lord Salisbury spoke truly when he said that "all England must depend on the energy of her people;" and if I should add anything to his statement it would be that Canada must depend on the energy of her people, intelligently directed by education.

But it is of no use our producing a good thing unless we are able to place it on the market where its excellence will be acknowledged. The proper marketing of our fruit demands several things; first, it must be placed in the best and most attractive package—in the sort of package demanded by the market where it is sent. I think we are extremely foolish in this country if we refuse to consider the tastes and requirements of the people to whom we are sending our fruit. If they say to us, "Your packages are too large and not of the right shape," we ought to accept their suggestion and try to meet their requirements. If they require a square package in preference to a round one, by all means let us provide a square package. Then we ought to remember that the man who is willing to pay the highest price must know that he is certain of receiving the quality of fruit that is equivalent to the money he is paying. My judgment is that

it never did pay, and that in the future more than in the past, it will not pay to send in these packages anything that is inferior. If culls are to be sold, let them be sold to our own people as culls, where comparatively no expense in the way of freight needs to be added to the great value of the article. But when we present our goods for the best customers let us see to it that it is honestly done, for in this as in other matters, Dr. Franklin's maxim will be found true that "Honesty is the best policy." On Monday of this week I received a letter from an old friend who is at present visiting in England. His former business having been that of a merchant he naturally takes a deep interest in the merchandise of his country as presented on the market in England. He says: "For over a month I have visited Smithfield market in Manchester, and to put it mildly, I am ashamed of the way Canadian apples are packed. With few exceptions one-fourth in each barrel are small, deformed and worm-eaten. The wholesale dealers assert that Canadian apples are liked best, and if purchasers could depend that the contents of each barrel would be similar in size and all of one kind, Canadians would hold the front rank in fruit."

Why should a Canadian visiting an English market thus have occasion to blush for the work of his own country? How long will it be before apple growers and apple packers learn the lesson that it is a suicidal policy thus to practice dishonesty. If I had my way, I do not hesitate to say that the man who thus undertakes to deceive our best customers and spoil our best market ought to be punished as his action deserves.

In addition to proper packing, proper transportation facilities must be provided, especially for the more tender fruits, if they are to reach the market at all. To send them there in a half destroyed state is worse than useless. I am glad to know that some effort has been made to undertake this work of cold storage shipments, but the effort so far has been an utter and entire failure. I have with me the report of the first shipment sent over under the cold storage system, and the statement of those to whom it was sent is that it would have gone much better if it had been sent in the ordinary way in the hold of the ship. This must be remedied, and I should like to see the fruit growers stand up and demand that some one be authorized to undertake the work who will see that it is properly performed." It is not enough for those in authority to say, "We have provided you with facilities. We must know that these facilities are of the very best. We have to compete with nations that are supplied with all the appliances of the very latest and best description. They are constantly making improvements in this regard. We cannot afford, if we would obtain what we ought to obtain in these markets, to send our fruit in any, but the very best condition. No government having the interests of the people at heart can long afford to disregard the claims of the fruit growers in this matter. There is every encouragement to afford assistance. We have proved our ability in this country to produce the very best fruit that can be placed upon any market. Our climate and our soil are such as in this regard will give us a decided advantage. Our people have the pluck and ambition necessary to make them excel. We will give them the knowledge requisite to the greatest skill; but all this is comparatively valueless unless those in authority are prepared, not in name but in reality, to assist in providing means of transport to the only certain market. What is being done for Australia must be done for Canada. It is not so much "fast service" that is needed as *safe service*. This Association ought to press its just claims. The Government which I represent here will always be prepared to render its best assistance to further improve products, but the matter of commerce must be dealt with elsewhere. I believe promises have already been given; it will be your duty to insist on their fulfilment. If these things are attended to, as I believe they will be, there is no fear that so far as fruit is concerned, Canada will hold a first place in the industrial race of the nations.

Mr. BOULTER: While I differ politically from the Minister of Agriculture, I feel a great deal of pride as a member of this Association in having the privilege of listening to him, and I certainly have a great amount of pleasure in moving a vote of thanks to him for his very able address.

SECRETARY WOOLVERTON seconded the motion, which was carried amid applause.

Hon. Mr. DRYDEN said all the thanks he required would be that the people would take heed to the thoughts he had suggested. With the Association at his back he proposed to continue on this line.

Mr. BOULTER, expressed his dissent from the report in one of the newspapers as to his remarks in the course of his paper read yesterday on British Columbia fruit, and asserted that he had never said British Columbia could not produce fruit; he had extolled certain kinds of fruit grown there, and said there were certain localities in British Columbia where they could grow good fruit; but there was not a man that tasted the British Columbia Northern Spy last night, that said it came up to the Ontario Spy.

Prof. SAUNDERS: During my ten years visits to British Columbia I have had opportunity of going over all their fruit sections and seeing their orchards and examining their fruits. I would not like to go as far as Mr. Boulter goes in regard to their quality; neither would I like to say British Columbia apples, all the way through, are equal to Ontario apples. I am sure that they are not in many sections, but I want to call your attention to the fact that there are two or three distinct climates in British Columbia. East of the Coast Mountain range we have a climate like that of England, with a heavy rainfall; that is about seventy miles from the ocean. This side of it you come to a climate practically rainless, where everything must be grown by irrigation. In that section the apples will probably be not quite so highly flavored as they would if grown in the ordinary way. The apples shown last night were from the dry section; they came from the orchard of Mr. Earl at Ashcroft, where they have no water to speak of. I was quite willing to admit that the flavor was not equal to the King as we have it here, for it is a little past its prime; but I have eaten good Kings at Agassiz, and the Government don't pamper their fruit trees any more than they pamper their officers—(laughter)—they give them good honest treatment, and that is all they can expect. Our orchard has not had any special fertilizing. The only good ground the people have for locating in Agassiz is that we have such a pure soil. At the same time we are producing some of the finest fruit that has ever been produced in British Columbia on that same soil, and we have now several hundred varieties of apples coming into fruit. Last year our Superintendent in an ordinary cellar kept some late-keeping varieties till spring; but we have not yet been able to pronounce definitely whether British Columbia is equal to Ontario in this particular, but from what I know and have seen of it I believe it can produce good winter fruit such as Spys and other late-keeping varieties that will command good prices in the world.

Mr. BOULTER: On the coast?

Mr. SAUNDERS: On the coast, I mean; I have not seen enough of the interior. I would like to bring before the notice of the Association some remarkable variations which have occurred at Ottawa in the common Virginia Creeper. This as it grows naturally has to be tied and pegged against the walls of houses. It is a very desirable vine for covering trellises and verandahs. A "sport" has occurred at Ottawa which, I think, is the same as Nicholson, in his "Garden," calls the Hirsute form, or hairy form. The tendrils have formed sucker-like discs at the end, and hence in growing it sticks to walls or woodwork or anything of that kind just as firmly and freely and fully as the A. Veitchii does. Where the Veitchii can be grown this has no advantages, but where it cannot be grown on account of its tenderness (and that applies to the greater part of Canada) this variety, I believe, will grow—indeed, it will succeed—anywhere over Ontario, Quebec, or any part of the North-West Territories, because it is a native there; and I was going to suggest to the Association that, if they thought fit, it might be well to send out some rooted plants of this to members of the Association, and we would be very glad to propagate enough to distribute, so that it will be better known.

PACKING AND GRADING APPLES.

Mr. L. WOOLVERTON, Secretary of the Association, read the following paper :

At the last meeting of our Association, at Orillia, the subject of packing and grading apples for the English market was discussed, but no very decided conclusions were reached. That some reform in fruit packing is needed is a settled question, as is proven by nearly every barrel of apples or basket of peaches purchased in our markets. The other day I ordered a basket of nice yellow peaches from the Hamilton fruit market, as mine had all been harvested and I wished a few for home use. When the top layer was removed the rest of the contents were white fleshed peaches and rotten at that. Who, that buys a barrel of apples in our city markets, expects to find the middle as good as the two top layers. I heard a packer once explaining that he was accustomed to put the poorer apples at the bottom, in order that they might bear the pressure of heading and thus save his finer specimens. "No, no," said the dealer who was shipping the apples, "do not put your poor apples at the bottom, put them in the middle, because the buyers open both ends of the barrel." Many times I have watched packers working under the directions of some of our large apple buyers packing apples in our orchards, and it is an open secret that the centre of the barrel is filled up with almost whatever comes. They say they have no time to carefully assort and grade the fruit. Well, if this is the case, then the apples that are thus packed should never be marked with XXX or "Extra Selected Canadian Apples." This kind of thing is bad enough in our own home markets, leading to want of confidence on the part of the public in purchasing fruit; but the damage to our country is a serious one, when it is practised in a wholesale way in connection with our export trade—a trade which is assuming immense importance. If, of the ten thousands of barrels that are being landed in Liverpool, London and Glasgow markets and are being constantly distributed throughout the United Kingdom, a large portion of them are packed in the way I have described, how can any honest, dealer who only ships a few hundred barrels in one season, ever hope to establish any reputation for his own fruit in face of so much badly packed Canadian fruit.

Even in spite of this terrible injustice which is being done to Canadian apple growers by apple dealers, Canadian Baldwins are kept away up in the English markets. For instance, under date of October 26, Messrs. Woodall & Co., of Liverpool, quote Canadian Baldwins at 16s. to 18s. 6d.; Boston Baldwins at 14s. to 16s. 3d.; Canadian Greenings, 15s. to 17s.; New York Greenings, 11s. to 13s.; Canadian Kings at 20s. to 25s.; New York Kings at 17s. to 21s.; and this in spite of the fact that our apples go to Liverpool without being packed in any uniform grade, or marks which have any definite meaning. If, under such adverse conditions, our fruit has met with such a favorable reputation in the British markets, what might we expect if our apples were put up in uniform grades and were properly marked? I have received orders from Edinburgh for extra selected apples of assorted varieties at four dollars per barrel, f. o. b. at Grimsby, when at the same time the common price paid by apple dealers in the vicinity was only one dollar per barrel for the fruit. Surely there is room for a fine trade in Canadian apples if once we are able to assure the distant buyer of the quality indicated by a certain grade or brand marked upon the outside of the barrel.

I do not know that it makes very much difference what package is decided upon for the export trade. Whether anything better could be thought of than our customary apple barrel is a question. During the past season I have been making some experiments with an apple case which when full weighs between fifty and sixty pounds, according to the variety contained therein. This package I have lined with shelving paper, and all the fruit was wrapped with tissue paper, and nothing was allowed to go into these packages but a fancy grade of fruit. Some of us have combined in sending about one hundred cases to Sydney, N. S. W., to the care of Mr. J. S. Larke, the Dominion Commissioner there, who had written me that the market there is bare of apples during the months of October, November and December of each year. When the report of the result of this shipment comes to hand I will be glad to place before you all the information. I have myself sent 100 cases to our Provincial agent

in England, Mr. P. Byrne, of Liverpool, in order that I may compare the two markets for Canadian fruit. I have also forwarded a carload of barrels and cases to Edinburgh and one to Glasgow, and, on receiving the returns from each of these, I will be able to compare the advantages of these different packages, and these results I will also be glad to make public through *The Canadian Horticulturist*. Uniformity in the size of our packages is certainly of importance. Some of our apple growers use the flour barrel, of which the length of stave is about thirty inches; others use the legal apple barrel of Canada, of which, I am informed, the length of stave is twenty-eight inches, or about twenty-seven inches from croe to croe. However, the difference in the two barrels is easily detected when they are standing side by side, and the fault here is in giving excessive measure, and not in cheating the buyer. In the smaller packages uniformity is sadly needed. At a meeting of fruit growers called at Grimsby during the summer this question was considered, and it was decided to ask the Ontario Legislature to regulate fruit packages according to the following scheme, it being understood that these sizes do not apply to fancy baskets in crates, but only to ordinary fruit baskets. The names given them are only to distinguish them; the sizes are supposed to be the same for each number, no matter what fruit is put in them. Taking wheat of standard weight as a medium to determine the capacity of packages, the sizes of fruit baskets were recommended as follows:

	Pounds.	Ounces.
No. 1—Pint berry box, should contain of wheat.....	..	12½
“ 2—Quart berry box “ “ ..	1	9
“ 3—Half peach basket “ “ ..	11	4
“ 4—10-pound grape basket “ “ ..	13	14
“ 5—12-quart peach basket “ “ ..	22	8
“ 6—16-quart grape basket, or 20-lb grape basket, should contain of wheat	30	..

I mention this here, in order that it may be discussed at this meeting.

But, to return to the important subject of grading, I believe that, even in our own markets, contracts could be made with much greater facility if we had some regularly established and well-known grades. I am sure that I may take it to be an established point with the members of this Association here present that the grading of our apples, at least for export, is desirable. The next point to be considered is, are the grades proposed satisfactory?

The following is a definition of the grades as found in the Dominion Inspection Act and also as proposed in the first draft of Mr. Dryden's Bill for the prevention of fraud in the sale of fruit:

Grade “No. 1” shall consist of well grown specimens of one variety, as nearly uniform as possible in size, and throughout of good form and color, sound and whole, and free from worms, bruises or disease.

Grade “No. 2” shall consist of well grown specimens of one variety, sound and whole, and throughout reasonably free from the defects mentioned in the preceding paragraph, but which, on account of inequality of size, lack of color or other defects, could not be included in grade “No. 1.”

Of course the packer may have both his extra and his fancy grades, which will be private, and which he may use at his discretion, but these are only sub-divisions of grade No. 1.

Possibly some shippers will object to the terms “grade No. 1” and “grade No. 2.” When the Bill was up before the House last spring some shippers said, “No, it will never do to put No. 2 on our apple barrels. Nobody will buy them if we do.” Well possibly the term “No. 2” is too strong, being so often applied to culls which are only fit for cider. If that objection is offered by many packers, I would propose that we simply say “grade A” and “grade B,” instead of “grade 1” and “grade 2.” However, for myself I am satisfied to use the terms already proposed.

The next question before us is: Shall the marking of the grades on packages of apples and other fruits be made compulsory? This is an important subject. The Bill presented to the House last spring met with the stiffest opposition from apple buyers,

because it read "For the purpose of this Act, the fruit *shall be* graded as follows." They do not wish to be compelled to mark the grades. They feel that the next step would be inspection and that careless packing might be mistaken for fraudulent packing. Well, perhaps it was too sweeping to compel every packer and shipper to mark the grade upon every barrel. Uniform ideas with regard to grading do not prevail, and every packer might not be posted with regard to the definitions of the various grades, or a shipper might buy a car of apples on speculation and afterwards himself become responsible for the grading which had been done by some one else, and thus he might become unfairly subject to a fine. Perhaps, therefore, it would be better not to make the grading compulsory, but by all means let us have a Bill that clearly defines what is meant by "grade No. 1" and "grade No. 2" when these terms are used and that makes it a fraud to brand a barrel as No. 1, which contains No. 2 apples. Buyers will in time demand that there be a uniformity respecting the grade of all the apples which they are purchasing, and further, the fact that such grades have been defined by an Act of Parliament and agreed to by our Canadian growers, will go a long way towards increasing the confidence of the buyer in making his purchase.

Then if a buyer in Ottawa or in Liverpool buys a carload of apples marked "grade No. 1," and they prove not to be up to the legal definition of that grade as laid down in the Act, the buyer will not be obliged to pay the sum agreed upon. These conditions will increase the trade in apples, the very thing that we fruit growers of Ontario desire to encourage.

The next point is: Shall there be a Provincial inspector, whose business would be to seize or confiscate any fruit offered for sale which he might discover to be fraudulently packed? I am inclined to think that this also would be a step in the right direction, and the fact that graded fruit was subject to inspection would tend to produce a wholesome fear of fraudulent packing on the part of all packers. But as fruit growers are the only class of men who never cheat, I need say no more under this head.

Let us now read very carefully and consider the proposed Bill for the prevention of fraud in the sale of fruit, from which those sections which refer to the grading of fruits were expunged before it was passed. I am inclined to think that with one or two verbal changes these clauses might be preserved and render the bill much more effective:

Proposed Bill.

AN ACT FOR THE PREVENTION OF FRAUD IN THE SALE OF FRUIT.

1. In sections 2 to 6 inclusive of this Act unless a contrary intention appears:

- (1) The word "fruit" shall mean and include apples and pears.
- (2) The word "packing" or "packed" shall mean and include the placing of fruit in any box, crate, barrel, basket or other article and the covering and securing of the same with slats or bars or with a lid or cover of any material whatever.

2. Every person packing fruit for sale in bulk *shall* mark upon the outside of the box, crate, barrel, basket, or other article in which the fruit is packed, in plain and legible words to be branded or written in a durable manner in or upon the material of which the article is composed:

- (a) The words "No. 1" or "No. 2," according to the grade of the fruit, or the word "ungraded," as the case may be, and
- (b) Except in the case of ungraded fruit, the name and post office address including the name of the Province, of the packer,
- (c) The name of the variety so packed.

3. For the purposes of this Act *fruit shall be graded* as follows:

- (a) Grade "No. 1" shall consist of well grown specimens of one variety, as nearly as possible uniform in size, and throughout of good form and color, sound and whole, and free from worms, bruises or disease.
- (b) Grade "No. 2" shall consist of well grown specimens of one variety, sound and whole, and throughout reasonably free from the defects mentioned in the preceding paragraph, but which on account of inequality of size, lack of color or other defects, could not be included in grade "No. 1."

4. All fruit not coming within the classes mentioned in section 3 of this Act, and which is packed and offered for sale in bulk, shall be classed as "ungraded."

5. Every person who after packing fruit or causing it to be packed, shall sell such fruit or offer the same for sale or otherwise dispose of the same without having made the marks required by section 2 of this Act, or any of them, shall be liable on summary conviction therefor to a penalty of not less than \$1 nor more than \$5 and costs.

6. Every person who with intent to defraud :

(a) Alters, effaces, obliterates, or covers wholly or partially, or causes to be altered, effaced, obliterated or covered, any packer's marks made on any article required to be marked under the provisions of this Act, or

(b) Counterfeits any such marks or brands or writes the same on any such article, after the same has been once marked, or

(c) Empties or partially empties any such marked article, in order to put into the same any other fruit (of the same or any other kind) not contained therein at the time of the original marking, or

(d) Uses for the purposes of packing fruit, any article bearing marks previously made by any other packer, or

(e) In making or purporting to make any of the marks required by this Act, falsely states the grade of fruit packed in the article marked or the name or address of the packer or the weight or measure of the fruit so packed,

Shall be liable on summary conviction therefor to a fine of not less than \$1 nor more than \$5 and costs.

7. Every person who shall knowingly and with intent to defraud so place or arrange apples, pears, plums, peaches, nectarines, cherries, grapes, apricots or berries of any description whatever, whether graded or ungraded, in any box, crate, barrel, basket, or other article, for delivery to any other person in such a manner as to conceal defects in size or quality in any portion of such fruit by covering the same with fruit of larger size or better quality or otherwise shall be liable on summary conviction therefor to a penalty of not less than \$1 nor more than \$5 and costs.

8. Every person receiving fruit of any kind mentioned in the preceding section for sale in bulk on commission, shall, within one week after any sale by him of such fruit or any part thereof, mail to the address of the consignor of such fruit a written notice of the price or prices received therefor and the name and address of the purchaser, and any person failing to send such notice or to give the particulars therein, required by this section, shall be liable, on summary conviction therefor, to a penalty of not less than \$1 or more than \$5 and costs.

9. No prosecution or conviction under this Act shall be a bar to any proceeding for the recovery of penalties which may be imposed under any other Act, nor to any action for the recovery of damages which may be brought by any person injured or defrauded by the sale of fruit in violation of the provisions of this Act, but all such penalties may be recovered, and all such actions may be brought in the same manner as if this Act had not been passed.

The changes which I would propose are as follows :

In section 2, instead of "every person packing fruit for sale *shall* mark on the outside, etc., I would substitute the words "may mark."

Then in section 3, for the words "fruit shall be graded," I would substitute the words "the grading of apples and other large fruits shall be defined."

Section 5 I would omit entirely.

The following is a copy of the Bill as passed by the Legislature :

AN ACT FOR THE PREVENTION OF FRAUD IN THE SALE OF FRUIT.

Vict. 58, Chap. 48.

I. Every person who with intent to defraud :

(a) Alters, effaces, obliterates, or covers wholly or partially, or causes to be altered, effaced, obliterated or covered, any packer's marks made on any article in which any fruit is offered for sale, or

(b) Counterfeits any such marks or brands or writes the same on any such article, after the same has been once marked, or

(c) Empties or partially empties any such marked article, in order to put into the same any other fruit (of the same or any other kind) not contained therein at the time of the original marking, or

(d) Uses for the purposes of packing fruit, any article bearing marks previously made by any other packer, or

(e) Falsely states the grade of fruit packed in the article marked or the name or address of the packer or the weight or measure of the fruit so packed

Shall be liable on summary conviction therefor to a fine of not less than \$1 or more than \$5 and costs.

2. Every person who shall knowingly and with intent to defraud so place or arrange apples, pears, plums, peaches, nectarines, cherries, grapes, apricots or berries of any description whatever, in any box, crate, barrel, basket or other article, for delivery to any other person in such a manner as to conceal defects in size or quality in any portion of such fruit by covering the same with fruit of larger size or better quality or otherwise shall be liable on summary conviction therefor to a penalty of not less than \$1 nor more than \$5 and costs.

3. Every person receiving fruit of any kind mentioned in the preceding section for sale in bulk on commission, shall, when requested to do so by the consignor in writing, furnish the said consignor, within one week after receiving notice or after disposing of the fruit as may be requested, with a written detailed statement in regard to the sale or disposal of the same, giving the price or prices received therefor and the names and addresses of the purchasers.

4. No prosecution or conviction under this Act shall be a bar to any proceeding for the recovery of penalties which may be imposed under any other Act, nor to any action for the recovery of damages which may be brought by any person injured or defrauded by the sale of fruit in violation of the provisions of this Act, but all such penalties may be recovered, and all such actions may be brought in the same manner as if this Act had not been passed.

EXPORT TRADE IN APPLES AND OTHER FRUITS.

Prof. CRAIG, said: I wish to make an explanation to the fruit growers of Ontario with regard to the trial shipment referred to at this Convention at different times. There is no need for me to dilate on the fruit interests of this country. That has been frequently given to you at different times already. I had intended running over rather briefly the resources of the different provinces, because I wanted to speak to you from the Dominion standpoint, as I am a Dominion officer and have the interests of the other provinces at heart as well as Ontario, but time will not permit at present. I want to come to that part of the subject which takes up the question of how we might get rid of our surplus products largely of a perishable character, and that brings us to a period of the year between the middle of August and the first of November. At that time we have a quantity of fruit of a perishable character in the country much in excess of the demands of our home market. Last year at the request of the fruit growers, on account of pressure brought from various points, we decided to make a trial shipment. Mr. Dryden referred to that this afternoon, and I am sorry he is not here just now to hear what I have to say on the matter, because if there was any failure—and there was a big failure—there is no one perhaps more to blame than I am myself, and I am here to take the responsibility of that failure. Mr. Saunders in his remarks last night I thought, rather put the onus on the fruit growers. Well, it does not rest there, and a body of men who are not to blame should not receive it. I want at the present time to make an explanation. The Fruit Growers' Association waited upon the Minister of Agriculture at Ottawa and asked him for some help towards getting fruit of this perishable class to England. There was no appropriation at that time to be specially devoted to this work, but he stated his desire and willingness to give them such accommodation as had been already prepared by a special vote of money for the exportation of butter; and I went to some of the pear growing districts and waited on some of the fruit growers, and we immediately decided that it was well to take advantage of the Government's offer at that time, and so we just interposed one shipment of fruit instead of a single shipment of butter. Now, that was an experiment. Mr. Dryden said that those who had charge of it should know. Without doing how could we know? We had had no experience in the line of shipping fruit, and I may say we made a mistake in making such a large experiment, but we had not the knowledge before us whether that fruit was going to get over there in good condition. We might reason from similar cases, and possibly might have reasoned more correctly, but we had not the knowledge before us, and we did the best we could under the circumstances and the fruit growers gave us the fruit and put it up in packages which we mutually decided were best and we shipped by Montreal. I do not want to lay any particular blame on the transportation company, but I will say that I asked them specially to see that that car was specially watched en route and that ice was put in whenever it was needed. However, it arrived there without ice, and the fruit in a very warm condition. There are two conditions to be kept in mind in sending fruit in this way. If we have a temperature of forty to fifty degrees we should have ventilation. If we have a temperature of thirty-two to thirty-four degrees we could ship without ventilation and in tight packages. In the case of low temperature no change takes place in the chemical make-up of the fruit, and no heat is generated; in the other cases a

slight change takes place and heat is generated. We had those close packages and had no ventilation. We had to keep the temperature sufficiently low that there would be no need of ventilation. That hope failed. I helped to put ice in the car at Montreal, and it was loaded at night and under the best possible conditions; but there was a sufficient amount of heat in the boxes to melt the ice that was in the compartment to keep it cool, so that by the time it arrived in England the ice had all disappeared and the fruit had generated a considerable amount of heat—so much so that it caused a great deal of decay and was a failure. But we are not going to stop there, and as the onus of the failure rests upon the officials of the Dominion Government I am pleased to say that the Government has now under consideration a scheme for the carrying out of this work next year to what I hope will be a successful issue. The outline of the plan has not been fully sketched yet, but I trust that it will be something like this—that eight or ten trial shipments—not necessarily large, because our experience of the past will show that we can get information with small quantities just as well as with large—will be made covering the perishable fruits of the different provinces; that these shipments will begin about the middle of August and be carried on as long as we see that we are deriving information of a valuable character to growers. That plan I think can be worked very well with the dead meat scheme which Professor Robertson outlined at Guelph the other day and which is also under consideration by the Government, and I have every faith that we can put our perishable products on the English markets in a good selling condition and that they will be of sufficient quality to attract the attention of buyers over there. I do not want to say a word against the commission men on that side, but I know they are a difficult lot of men to move out of certain channels, and it is difficult to get them to adopt new ideas, and I do not know that we can through them arrive at the best results on this matter, but we shall do our very best to bring this work to a successful completion and use our very best judgment; and I would ask the co-operation of the fruit growers in regard to suggestions, and anything else that may be given along that line to the officials who are likely to have this matter in charge. (Applause.)

Mr. A. H. PETTIT: I also regret Mr. Dryden's absence from the room just now, because I want to reply to one or two remarks he made to-day in regard to the shipment of our fruit to foreign countries. In my estimation we are to-day in a rut, and we have to get out of that rut. Why is it that the fruit growers of this country most capable of putting their fruit up in proper shape and forwarding it to the British market are not doing so? Well, I will tell you why I am not doing that, as one. For fifteen years I have exported to foreign countries more or less apples each year, and I have come to the conclusion that the system of handling fruits in England is not a system that is in the interest of fruit growers of this country. We have also had a little experience in our own cities and towns during the last four or five years in handling fruit in that manner. They have been trying it in Montreal and Toronto—that is the auction business. Do you think for one moment that the fruit growers of this country can put up their apples, ship them to London and those points and have them auctioned at a common sale? I would ask Mr. Karn, who is in the room, would that be the way that he would expect to receive returns for his pianos and organs were he to ship them to those cities and have them put up at auction? We must get out of that rut and educate our men to put up fruits for fancy markets and then sell to the consumer of fruit in the best possible condition without the expense of the middleman if possible. Until we can arrive at that point I do not think we can win the confidence of the fruit growers of this country to put up their apples and ship them to that market. Now, how are they shipped there to-day? I have been both buyer and shipper, and I know. To-day the condition is this, that if I buy ten or fifteen thousand barrels we begin taking our apples throughout our section from the 10th to the 14th of October. Now how long have you got to do this picking and packing? (A voice: "About two weeks.") They employ a number of people to pick their apples and pack them, and pay them so much a barrel to put them up. They want to put up as many as they can; it is natural that they want to make as much money as they can—that is all they are working for. Now I claim as a rule they cannot get experienced men to pack those apples as they should be packed in that space of time,

and not being packed in proper condition they are sold in the Old Country to the discredit of many growers who are not to blame in this matter. I say there is no man more capable of packing apples for the British market than the grower himself; and we must get out of that rut so that we can ship them to the market up to a certain brand. A gentleman says: "Why don't you work up a brand of your own for the British market?" I did that once. My apples brought me a good price and got me a great deal of credit for arriving in good condition. What was the experience next year? London got crowded with apples and the commission men, who had branches in London, Glasgow and Liverpool, advised that I had better ship to Glasgow. I got a great deal of credit again; they arrived in fine condition. The advice next year was to ship to Liverpool; the next year the advice was to ship to Chicago, and they went there. My life is not long enough to establish a character in that way, and if I have to ship to different points each year I will never reach the goal I aimed at in the beginning. Let us get out of the rut, if it is possible to do so. The Old Country people are very staid in their ways; everything has to be done through a certain channel; but I believe if we as fruit growers were united in this matter and asked Prof. Craig and the Government, in connection with those fruit experiments they are going to try, that they would also go on to that country and establish a trade for us in some limited way, we in time would get out of that rut and be dealing with the consumers of that country, to the advantage of the fruit growers of Canada.

Mr. BOULTER: Do you recommend that each grower pack his own apples and ship them to England?

Mr. PETTIT: I say when you get out of the rut in the Old Country that you are in now and have your goods handled as they ought to be, directly by the consumer, then I say let the fruit growers pack the fruit themselves and sell them to the best advantage, and in my opinion they will get double the money they are getting now.

Mr. BOULTER: If I had a thousand barrels of apples and was selling them I never would pack one of them. I would rather the man who bought those apples would oversee the packing of them, and send his men. I would pick them and put them there and let them pack them, because if you pack them and the price of apples dropped, no matter how much, there would be some rebate required on them, and you would have trouble before you got through with that buyer. The experience of the growers in Prince Edward county, who have had thirty or forty years' experience, is that it is better for them to sell their apples either by the orchard or by the barrel and let the buyer send on his men. They are not employed by the barrel, but they hire these men by the day and they put up their apples, and the result is that when the farmer's apples are drawn to the car he gets his money and his responsibility ceases, no matter what the fluctuation of the market. As a large buyer of peaches in the Toronto market, I say it is scandalous the way the fruit is put up. I had a wholesale man in Quebec last August say that his experience in 1894 was that he never got a decent peach from the city of Toronto—worthless things in the bottom and middle and good peaches on the top. Now there is a great deal to be learned in packing. I believe Mr. Woolverton has endeavored as far as in his power to improve the system of our growers in putting up a better class of fruit and using boxes. As regards grading: If No. 1 and No. 2 are objectionable as names why not have the words "Standard" and "Extra Standard;" but I do hope that some system of grading fruit will be recommended by this Association to the Government and carried out.

Mr. PETTIT: As regards Mr. Boulter's remarks about last year's peaches, I am only surprised that he got a few good ones on top, for I don't think there were any good peaches in the peach-growing section last year—they were the poorest that were ever grown in that section. I believe the fruit growers of this country can pack their fruit just as nicely and well as any other class of people on the face of the earth. (A voice: "Of course they can;"—hear, hear.) I say they want education along the line of the best method of packing for foreign markets. There is our weak point, and when we get out of that rut in regard to shipping to the British market we will

get a healthy business along that line. I beg to move our appreciation of the action of the Government in proposing to take along that line by the trial shipments, and that we as fruit growers hope that they will carry it to a successful issue in the interests of the fruit growers of Canada.

Mr. BOULTER seconded the motion.

Mr. CASTON: The short time between the picking and the shipping of the apples does not make it practical to pack them properly for the Old Country. In Meaford and Thornbury they have frost-proof storehouses—paying so much a barrel in the orchard and taking everything except the culls, and putting them all in the barrel quickly, pressing them sufficiently to keep them from bruising until they reach the storehouse. We always give instructions to packers to pick them carefully. Sometimes with some hard apples it is impossible to detect a poor one, and pickers will shake them off the trees in a hurry. If they stay in barrels any time and are repacked we can detect them. McWilliam & Everist, who handle about fifty thousand barrels a year, are doing the same thing—having them repacked for the English market, with the exception of fancy packing in cases. Repacking is the most practical way of doing it for the Old Country.

Mr. McNEILL: We should decidedly thank the Government, and particularly Prof. Craig, and not the slightest blame should be attached to him, for he had not the facilities at hand which were needed for successful cold storage. It is one of those mistakes that anyone is liable to make, and one scarcely anybody can foresee. I think Prof. Craig is saying too much when he says he is to blame for this thing, and I think we should thank him for the efforts he has made in this direction.

Mr. A. H. PETTIT: We all know we can make a small shipment of these perishable fruits to England without the least trouble; but what we want to provide for is the large shipment, the commercial shipment, such as you and I would want to make if we were shipping a carload; because if you put a carload together in the hot season of the year it would itself create heat.

Mr. SHUTTLEWORTH (Bow Park): Denmark is producing fine apples; France is producing good apples, and they are putting up all kinds of fruit in just as good condition as we are, and yet they are nearer the market. I don't think we will be able to export the kind of grapes grown here at the present time. England is getting grapes from Lisbon, very much superior to anything we have here, and which suit the English taste; they are accustomed to eat a fancy grape, one they can bite. Englishmen don't swallow the seed; they usually bite the grape; they have been accustomed to eat what they call the highest class of grape. The Lisbon grape is better in that way, as they don't give a sour taste in the mouth, while our grapes give a sour taste. In France and Jersey Island they have very fine fruit, and these are very near the English market. When I opened up fruit that was branded as No. 1, I have been almost ashamed I was a Canadian; that will confirm what the gentleman wrote to Mr. Dryden. You may call your grapes No. 1 or No. 2—an Englishman don't care what you call them as long as you give him what he pays for. I don't think that anyone who understands the condition of the market will object to having fruit graded No. 1 and No. 2. Only those who have a desire to get No. 1 prices for No. 2 fruit would object, and these we want to get rid of, whether growers or exporters. Our firm handles about a third of the total exports of American apples to Europe; that is, we handle from three to five hundred thousand barrels a year, and I have watched very closely this matter of classification and grading, and a great many of our apples classed as No. 1 are not No. 1. I wish we could have a law that the packer of apples not No. 1 who brands them as No. 1 should be fined and punished, because it is a fraud, the same as shipping a filled cheese. In trying this experiment I think the Government should really understand the conditions that exist in the English markets and what they have to compete with before they disappoint shippers. Tomatoes from France and Jersey Island and Spain, come over to England, costing for freight about one and sixpence, a large case holds what may be considered a barrel; they come in packed in boxes about 175 or 180 pounds in a box.

The PRESIDENT : This is a very interesting question, and we invite apple buyers and shippers to join in the discussion.

Mr. SHUTTLEWORTH : I am not only a shipper ; I am a grower. I claim I am a Canadian grower now, I am Canadian born, though I have been living in England so long, and I would like to give my views more definitely on the point, in a uniform manner, that is dealing with each question. I would be glad to answer any questions, I would like to see our Canadian trade increased.

On motion of the SECRETARY it was decided to resume the discussion to-morrow morning after the election of officers, and the meeting adjourned at 6.15 p.m.

SECOND DAY—EVENING SESSION.

The session was held in the town hall, the audience being larger than during the day.

President PETTIT read his annual address, which appears at the beginning of this report.

THE IMPROVEMENT OF THE GLADIOLUS.

Mr. H. H. GROFF, of Simcoe, read the following paper :

In an article published during the present year, by one of the leading horticultural journals of America, the statement was made that " there had been no improvement in the Gladiolus during the past ten years." It will be of interest to consider the general condition of this popular flower at that time, after it had been before the public for some forty years, and since then, during which all the new strains have been introduced. But before going more fully into the question, I beg to advance the claim that there has been more improvement during the past five years, than during the whole preceding period of its history.

The Gladiolus of ten years ago descended from a cross between two Cape species, and is known as the hybrids of Gandavensis, the section in general cultivation. For many years the varieties originating from this cross have been inbred without careful selection, which has resulted in one of the most variable plants known to the hybridizer ; in fact this condition is made ground for the claim, that there is no advantage to be gained by hand pollenizing, as the leading varieties of commerce are the outcome of natural fertilization.

The extent to which this indiscriminate seed raising has been conducted, may be better understood when it is known that commercial seedlings are often grown from seed than can be bought for a few shillings per pound. Such seed can hardly be produced from valuable varieties, for the process of said raising is most exhaustive to plant life, and so apparent is its effect on the degenerated vitality of the hybrids of Gandavensis, that if they survive the effort, it cannot generally be repeated without an intervening season of rest.

Now to admit this sweeping assertion, is to concede that the work done during a comparatively recent period, the first results of which were introduced about five years ago, has indicated no advance on the line of improvement, and that the time of Kelway, Souchet, Lemoine and others has been wasted, in their efforts to increase the beauty, and strength of the subject of this paper.

It will here be in order to consider the meaning of the term improvement as applied to the Gladiolus ; and I take the practical and popular ground that it should mean ; first, the beauty of the individual flower ; second, strength and vitality of the plant ; and third, arrangement. During the past season, many visitors to my trial

grounds containing some 1,000 named varieties, would stop before a hybrid of distinct merit; the plant and straight spike stood six feet high, bearing a few open flowers rivaling the orchid in its richness and beauty; and without exception it was pronounced the gem of the collection, thus proving the first principles of improvement.

We often hear objections made to a variety or strain, condemning it for lack of substance. Now, while *Camellia* like petals are most desirable and too rarely obtainable, their absence cannot be made a point for rejection, unless at the sacrifice of some of our most beautiful varieties. Substance is largely a question of weather; for if after a period of cool moist conditions, a few hours of intense heat prevail, very common occurrences in our variable climate, large flowers must wilt, and the larger they are the worse they are affected. The remedy, however, is easy and most satisfactory, cut the spike when the first flower opens, blooming in the house, where the last bud of any size will do even better than in the open ground. This treatment also strengthens the bulb.

The first of the crosses between the hybrids of *Gandavensis* species is popularly known as the Lemoine section, the varieties of which in general cultivation partake largely of the characteristics of the species, their peculiarity being rather weak plants with crooked stems bearing small bell-shaped flowers. From these conditions the past five years have seen developed one of the most beautiful and popular *Gladioli* in existence, a plant of great vigor, straight spikes, and flowers of the largest size.

Among the newer hybrids and the best finished of the crosses with the species *Saundersonii*, is the Nanceianus section introduced in 1890. While the general coloring of this strain is in shades of red, partaking as it does so largely of the blood of the species, the wide open flowers are of enormous size, and great richness and brilliancy of coloring. The plants of the newer varieties are robust, the flowers of good substance, and bulbs of great vitality. To say that this is no improvement is to ignore a class, the influence of which will be seen in choice work yet to be introduced.

That section of European origin offered under the name of Childsi in 1893, is the latest of the *Saundersonii* crosses in order of introduction; it is the result of crossing the hybrids of *Gandavensis* on the species. The plant is of robust habit, with flowers of the largest size. While lacking the finish and coloring of the Nanceianus section, it contains the first break from red shades among the *Saundersonii* hybrids as known to the amateur.

It has been my privilege to test many varieties in advance of their dissemination, among which are the new hybrids originated by Mr. F. E. Gray, of Alhambra, California. When these are introduced, the value of the infusion of new blood of the species will be more fully appreciated. With me these plants bearing spikes over two feet in length, attained a height of fully six feet, with flowers of the *Gandavensis* form four inches and more in diameter.

Without reference to any strains yet to be introduced, it is with every confidence that I rest my contention on the evidence preceding, that the *Gladiolus* has improved, and will continue to do so for many years to come.

MR. W. E. SAUNDERS: I would like to ask if Mr. Groff has obtained any very different results by planting bulbs at different depths in the earth; also, I would like to know the parentage of Nanceianus on both sides.

MR. GROFF: My reason for not giving details in connection with any of the various sections was that they were fairly well known. The parentage is a cross between the Lemoine and a species of *Saundersonii*. My rule is to plant six inches for large bulbs. My reason for that is that the new corm forms above the old one, reducing the depth to five, whereas if you plant only four inches, as often recommended, it reduces it to three. However, if your soil is shallow it would be much better to plant nearer the surface and ridge it than plant so that the new roots will find no nourishment in the barren subsoil. My own soils of course have that peculiarity.

MR. MITCHELL: It has been my practice about blooming time, or a little before, to earth the stems, and I find it did them no damage, and helped to keep them from falling over.

Mr. GROFF : I have not tried that. I am always working between the rows, and I like to have a footing as level as possible. I always plant a depth of six inches ; but I recommend that as an alternative where shallow planting is practical, if it is necessary.

The SECRETARY : Which bulbs are best for amateurs to plant ?

Mr. GROFF : Canadian grown bulbs. You may think that this is talking shop, but there is a great deal in having your stock acclimatized. Last year I imported some three hundred varieties from one of the leading firms in Holland, and from the whole lot I did not get thirty spikes of bloom, and of them about fifty per cent. died, as a result of the change I suppose.

Mr. G. R. PATULLO : Has your success been such as to give you a market elsewhere ?

Mr. GROFF : Yes ; but I have not been long enough engaged in the work of reaching into foreign markets ; still for 1896 the leading firms of America are listing my hybridized seeds as a novelty, each one bearing my name and address. If not out of order, I would like to say a few words as to my own work. While in a general way it is for the improvement of all the sections, specially it is with the idea of producing new colors and shades practically unknown to the amateur, my lines of operation having been approved of by no less an authority than M. Lemoine. With this view I am constantly corresponding with specialists in Europe and America, securing their most choice work often in advance of its commercial dissemination, for the purpose of crossing with varieties of a suitable character in my own collection. One sends me a seedling, the most beautiful he ever saw, after importing freely the cream of the latest foreign work. Another seedling, the best of its type, would neither increase nor produce seed with its originator, but did both with me, showing the benefit of climatic change. One variety of rare merit secured in this way was pronounced by an expert to be worth its weight in gold. It will therefore be understood that the chief object of my work is the production of new varieties by hand-pollinated seed, my experience with which has been that fully seventy-five per cent. of the varieties thus produced are worth retaining. After some years of selection and increase of distinct varieties of merit, for the coming year's work I have added all of the latest introductions of Souchet, Lemoine and others, including the whole stock of Mr. Burbank's new California strain, described by him as "the cream of all he ever produced, his last and best selection." In adding the above to my already choice stock, the result of former work justifies me in the conclusion that seed and seedlings produced from the crossing of these strains must be the greatest advance in commerce. This claim is already supported by the fact that the leading firms of America are willing to list my seed as a novelty, to be furnished in the original packets, each bearing my name and address.

Mr. RICE : Do you plant them out first ?

Mr. GROFF : Plant them out first. Of course they can be forced under glass, but there is nothing to be gained by it as affecting the quality of the flower—in fact the contrary. I might say that if you wish to start them you should always use bulblet-growing bulbs, not use old bulbs.

Mr. LOUGHEAD : Do you consider using large bulbs that they are apt to degenerate ? Do you encourage growing from spawn and bulblets in order to keep up the quality of the stock ?

Mr. GROFF : It is the general experience of growers that varieties of the *Gandevensis* degenerate, and that has been my own experience, inasmuch as it is the custom of European introducers to send us high-priced bulbs running from one to three dollars each from which seed has been raised, and if these produce the characteristic of the flower it is the exception, and they often die before they recover sufficient strength after enduring the climatic changes to really let you see what they should be ; and it has always been my rule to endeavor to procure grown bulbs from these. You can get the characteristic of the flower from the old bulb, as a rule, the first season if you are able to carry it over, but it has been invariably declined ; they simply won't furnish them.

Mr. MCNEILL: What diseases are the bulbs subject to? I found that when I transferred my collection to stiff clay I lost them all with a fungus disease that left the bulb in cup-like shapes with a resinous margin.

Mr. GROFF: On my own ground, although it is very small, where I have four varieties of soil, when I plant in stiff clay I open out a trench, putting in my bulbs and fill it up with loam; and stiff clay is the one soil that is objected to for the growing of the bulb. The disease I presume will be attributed to the condition of the soil on which it is grown.

Mr. MCNEILL: You have never observed that disease?

Mr. GROFF: Mine have always been healthy.

Prof. CRAIG: Please repeat your instructions about cutting off the flowers in hot weather.

Mr. GROFF: I think this bulb should be grown very extensively in every garden for cut flowers. When the first bud opens, cut off simply a spike, not too low or you would injure the bulb in its development. They will bloom set in water in the house. In the large cities where light colors are used for general purposes, funeral decorations and others, they bloom them in the cellar to eradicate any colored stains that might be developed by the light.

Prof. CRAIG: What time do you cut them?

Mr. GROFF: Just as the first flower opens.

A DELEGATE: Planting the same bulb year after year, does it degenerate?

Mr. GROFF: In the *Gandevensis* that is the case. At the same time an infusion of the blood of the species has increased their vitality to such an extent that you can plant them indefinitely.

A DELEGATE: How would you replace—get new ones?

Mr. GROFF: Yes, unless you get old bulbs a second time. Dealers like to send out the old bulbs in preference to the small ones.

PUBLIC PARKS AND GARDENS.

Mr. G. R. PATULLO, Registrar of Oxford, read the following paper:

Coming first to the second part of my topic, I shall say little; for the question has already been dealt with by another member of our Association, who is much more competent for the work than I. Then, too, the desirability of public gardens in all our chief towns and cities is almost universally acknowledged, if not carried into practical effect. Of the character of such gardens, their number, size, arrangement, design and attractions, a layman must hesitate to speak in the presence of an audience that represents the expert horticulturists of the country. But that public gardens of such character and extent as are appropriate to the varying circumstances of the several towns and cities of the country, yea, and of villages also, would be a great attraction and would also be of material advantage, is undoubted. For the most casual observer will have noticed that one of the features by which a town or city is judged by a stranger is the attention that is given to beautifying it, by handsome tree-lined streets, well-kept boulevards and lawns, and tastefully arranged gardens, public and private. All these contribute to make up the character of a town or city, and by them too, the character of the citizens is determined in popular estimation. They indicate not only thrift, and a degree of prosperity, but also intelligence, good taste and culture. Hence they become important elements in attracting population and in making home-life worth living. All this and much more might be said about public gardens; but I desire specially to speak, by way of suggestion chiefly, upon the subject of public parks. Thus far Canadians may be said to have had little time for the consideration of matters other than those that pertain to the most practical side of daily life. The pioneers who have hewn from the primeval forest the beautiful homes and homesteads

that now dot our land were concerned chiefly in a struggle for existence. They had first to overcome the great obstacles that nature placed in their path and when that task was accomplished, as it was most nobly, they, alas, were for the most part, quite past the age to turn their attention to the work of beautifying and making more attractive the land in which they had cast their lot. That task is now ours. Our forefathers may be said to have represented the common school of our natural progress. We represent the high school, the collegiate institute and the university. That public parks are deemed desirable and indeed necessary in our national progress may be inferred by the action that has already been taken in establishing several of them by both the Dominion and provincial Governments. The first of these established was that at Niagara Falls. This in a sense is an international park, for the great State of New York, preceded the Province of Ontario in setting aside a reservation for park purposes immediately opposite that subsequently established by the Ontario Government. By this joint action, Niagara Falls—once a hissing and a by-word because of the petty devices that were practiced upon visitors to the World's greatest waterfall—is now one of the most beautiful and delightful spots for the tourist and visitor, and one to which he may go and enjoy to the full as cheaply as he may pay a visit to any city in the land. Thither go annually tens of thousands of visitors where formerly there were not hundreds, and there citizens of the two great Anglo-Saxon speaking nations of this continent can meet in friendly social intercourse let us hope may under the shadow of the great Falls the roar of whose thunder forever hush all sounds of strife and discord between those who are proud to own a common mother. The provincial Government has also established a public park in the northeastern portion of the province. The Algonquin Park, with a vast territory of forest land, with lakes, rivers and waterfalls, that are destined to make it a delightful place of resort for the pleasure seeker, the lone fisherman and the huntsman. At Rondeau also on Lake Erie, another park with somewhat similar attractions has been established, and others will doubtless follow. The Dominion Government, too, has most wisely taken advantage of the surpassing beauties of the Rocky Mountains scenery to establish a great national park at Banff. Apart from the natural attractions of this park it is rapidly becoming a popular sanitary resort because of the curative qualities of the baths there. All these parks have been established with the cordial endorsement of both political parties for each side of the House vied with the other in giving authority for the necessary legislation and expenditure.

But while our public park system is so far satisfactory, why not extend it still farther? The parks already mentioned are perhaps chiefly for the pleasure seeker, the tourist, the fisherman or hunter—in a word for those who, in a sense, least need the recreation and enjoyment which they may afford. Why not extend the system so as to include in their enjoyment and advantages all classes of the community? So as to make it possible for the poorest and the humblest citizen of the land to enjoy the free pure air and all the attractions that a pretty park affords? This is the question and the message that I have for the Provincial Horticultural Association. My meaning is briefly this:—Why should not only every city and town, but also every village and township in the province have a public park or parks? Is there one of them that does not offer the natural advantages therefor? And how many of them invite you by their great and transparent attractions to go in and appropriate them for park purposes? Speaking for this county, and in point of picturequeness it lacks the attractions that lake, river and mountain scenery afford, there is not a township, nor indeed a considerable village, where a beautiful park could not be acquired and established at a small cost. There the poorest citizen with his wife and family may go as opportunity offers to enjoy the pure air, the green sward, the shady grove and it may be the sweet song of the birds that are denied to him within the limits of their own humble home. Mothers and children would especially enjoy such a boon and the latter would surely wax stronger and better, and become healthier and happier men and women because of it.

There is much talk current now-a-days of what our country produces and what it manufactures. But its most important product, must always be its people. That they may grow up to be strong, healthy and happy is a first consideration. And whatever we can do to accomplish that is a national gain. Life must be made attractive alike to the

rich and the poor—to those whom Abraham Lincoln was wont to call the common people. If we are to be a contented, happy and prosperous people—a people united in the grand purpose of building up a new enlightened and great nationality on this continent.

Mr. RICE: I fully approve of the paper, and looking at the location of this beautiful city situated as it is among the everlasting hills, I have been thinking our friends might have a very interesting park here. I have often been pointed to a hill near here as being the loftiest in this section of Canada. (Hear, hear.) We always look at that with great admiration—with its rounded, beautiful form, the little patch of woods on one side, and all its associations, overlooking as it does the stream that runs below, and the railroad trains, and all that. Now, why not have the top of that hill made into a beautiful park, planted with your choicest maples that I see growing everywhere in this city, growing as they do only in Vermont and some highly favored countries, and thus have here one of the most beautiful spots on earth?

Mr. HUGGARD: In the last three years we have established three parks in the town of Whitby. The town lies back from the lake about two miles and it is not convenient for the people to get down to the lake for an hour's outing, so we have a four-acre park almost in the centre of the town just outside the business part. (Hear, hear.) A little further on, between two schools where the children want a place to play, we have an acre park; and last spring on the banks of the beautiful Lake Ontario—one of the finest on the world, and a bay that cannot be surpassed—we have twenty-five acres laid out. I hope the suggestions in the paper will be adopted by other towns more fully.

Mr. RACE: We have another American visitor who is the owner of one of the finest private parks in America, and knows how to make a private park; I think the audience would like to hear something from him.

Mr. WATKINS: I would add to the title of the paper so as to have it read: "Public and Private Parks." I believe that no expenditure of time and money is so valuable to the owner of a farm as a nice little park. (Hear, hear.) Every farm should have one, if it is only a quarter of an acre; it would become the loved spot of his life. My park was created from a natural instinct I had to go wild. I was always fond of anything that grew in nature, and I must have them about me. This instinct has led me to all parts of the world to see nature, and I planted my park so that I would be always in touch with nature. More than that, having a family of children I felt that if they were raised in close touch with nature, with the trees and flowers surrounding them, they would go right every time, and if I could have blocked out the course that my children have taken I could not have done any better. They have all gone right, and I believe the contact with my trees and flowers has largely contributed to their welfare. (Applause.) My park covers sixty-five acres, and it has been the work of spare moments during forty years of my life. I have planted almost everything that is indigenous to our country, and have also made it a geological field, gathering stones from all countries and places so that children coming there from schools and cities would have an opportunity to see the structure of the earth. The park is simply for the amusement of myself and family, but about thirty days in every year it is opened, and I furnish teams and ice and service and everything to entertain everybody that comes there. I have induced the Michigan Central Railroad Company to run their trains out, as they say at the price of oil and men, and say nothing about the wear and tear of trains, and bring out children from the cities; and when we get a great many peaches ripe we get a good many children that never ate a peach before, and fill them full—(laughter and applause)—and if you could see them eating a good peach and then another and another you would get your money's worth. (Laughter.) Nearly every field on my farm has a corner that is a little park—a lovely quarter of an acre that has been planted with deciduous trees or evergreen trees, and makes an evergreen spot. My roads are all decorated. At first I made a great error in planting straight roads with trees largely maples. Afterwards I thought better of it and planted alternate trees of different kinds, black walnuts and butternuts and all our deciduous trees, even oaks, and grouping them, and now they are beginning to look beautiful; it is a very great change for the better. (Applause.)

Mr. SNELGROVE : Have you birds ?

Mr. WATKINS : I have them in fine numbers, and they never trouble the fruit at all except the sparrow ; and I believe I would rather have them than any if there were not any other birds. (Laughter.)

Mr. SMITH : Mr. Watkins did not state the size of his farm. It is two thousand acres in one block, with something besides, so there is a chance for making parks.

Mr. WATKINS : I don't wish to lead you astray ; I am a genuine farmer, and what I don't know about farming you can leave out. (Laughter.)

Mr. MCNEILL : It is a pleasant thing to hear this testimony of a good American friend coming over here and showing us how to do these things. (Hear, hear.) In some of the large English parks they do something of the same style, but I don't believe they do it with the overflowing generosity of our American cousins.

Mr. WATKINS : I have spent many a happy day in old England, and I have yet to meet a people that I was so at home with and who gave me so much pleasure as the people of merry England—(applause)—and I would say their hearty style of doing business hits me exactly. When I got tired of travelling about Europe I went to England to rest. (Hear, hear and applause.)

The SECRETARY : The Waterloo Society has been doing something in the way of a park in their town, and I am sure we would be glad to hear from Mr. Lockie, the President.

Mr. LOCKIE : I am afraid the Secretary gave our Society credit for more than it deserves. The park was originated four or five years ago. In pursuance of the Act that was passed by the Ontario Legislature allowing municipalities to borrow money for park purposes, our town very wisely bought a nice piece of land near the town with a very fine sheet of water on it, a beautiful spot with large trees about it, and laid it out for park purposes. It has been a great source of pleasure to the town, and even of profit, for people come from other municipalities to have picnics and excursions in order to enjoy our park. Last year our Society bought flowers and helped in this way to make the park beautiful and pleasant. We hope that it gave the park commissioners an idea that they will continually enlarge upon. (Hear, hear and applause.) I hope when the Fruit Growers' Association comes to Waterloo to hold their annual meeting they will see and enjoy our park. (Hear, hear and applause.)

Mr. CASTON : I think hunting is prohibited in the Algonquin Park, although Mr. Pattullo spoke of it as the huntsman's paradise ; and I trust that noblest and most graceful animal that ever ran the Canadian woods—the red deer—will be preserved from total extinction. (Hear, hear.)

THE CULTIVATION AND MANAGEMENT OF HOUSE PLANTS.

Mr. SCARFF read the following paper :

The cultivation of flowers is an occupation that improves alike the body, mind and heart. It is an almost certain indication of purity and refinement. We can afford to cultivate and study flowers, if for no other reason than their cheerful surrounding. Many do without flowers because they think they cost too much time and trouble, but all things worth having cost considerable and anything worth having is worth working for. Oftentimes the partial success, or, in many instances, total failure, in the cultivation of flowers is due to the fact that we try to do too much. No one should have more plants than one can fairly manage or take care of ; too often do we see many plants crowded together in a poorly lighted window, compelling each plant to take on a form never intended by nature, and foliage quite different from that desired by the owner. One of the chief requisites in the management of house plants is plenty of sunshine, next an atmosphere neither too dry nor close, and a uniform temperature, lower during the night than during the day. As the days become longer

and brighter, more room between the plants must be given ; for nothing detracts more from the appearance of plants than standing too close when growing rapidly. More careful attention should also be given to proper ventilation on all suitable occasions. This is absolutely necessary to the health of plants.

The Soil. With regard to the soil best adapted for pot culture : Soil for pot plants should always be carefully prepared. For this there is no better foundation than well-decayed turf that is full of root fibres. Many plants would need nothing more ; strong feeders should have manure added. Perhaps the soil that will best suit the majority is two parts decayed turf to one part of well rotted manure and one part sand, which will make a soil that will not bake.

Watering. Rain water is better than spring or well water. Hard water may be greatly improved by adding a drop or two of ammonia, or a little soda, a small piece about the size of a pea to every gallon of water used. Morning is the best time to give water, and evening next. Never water house plants when the sun is shining brightly on them. The supply of water must be regulated according to the demands of the plants. Apply when needed, but never in excess. The condition of plants and soil is the best guide. Never give water when the soil is moist to the touch. The leaves of all large-leaved plants should be thoroughly sponged off at least once a week with tepid water. This tends to keep the plants in health and free from dust. Nearly all plants require more water when in bloom than at any other time, more in a warm temperature than in a cold, and more when in a state of active growth than when at rest. Plants in open rooms usually require water once a day and some demand it twice. Drainage in the pots must always be attended to, as stagnant water at the roots will result in diseased plants and impoverished flowers.

Gas. Its use for illuminating is a drawback to plant culture in the same rooms. Plants are better off for being in rooms that are never lighted much artificially. If the plants can at night be cut off by partitions, or moved to unlighted rooms, it should be done. If not, harm may largely be prevented by covering them with paper covers while the gas is lighted.

General Management. Pay strict attention to airing, give air when opportunity offers ; try to secure a uniform temperature without draught. All the light obtainable at this dark season is needed. Roll up the curtains clear to the top during the day. Give extra protection to plants during severe cold nights. Plants coming direct from the florist's often fail when set in a window at this time of the year, because the tender greenhouse plants are not used to the exposure in the much colder window. Be sure to get plants that are thoroughly hardened, and to warm the rooms where such plants are in the window sufficiently to carry them over this change in a gradual way. Be sure to give all plants in the window the space they require. Crowding is in no case desirable. For the better protection of plants near the window in severe cold nights, the plants may be taken from the window, placed upon the table in the centre of the room and covered with paper.

I have frequently been asked the cause of plants dropping the leaves. Whenever this occurs, we may be sure the health of the plant is impaired in some way. The plants may have been kept too warm or too cold, given too much water or not enough of it ; they may have been injured by crowding or with strong stimulants, or allowed to become pot bound. The first thing to be done is to make a thorough examination. Knock the plant out of the pot and see if the soil is too dry or too wet, or whether the feeding roots are destroyed.

Injudicious watering or applications of strong liquid manure may result in the death of the plant. Re-potting in light and rich, rather dry soil, especially if a new or freshly cleaned pot is used, will give relief in most cases. The pot need not be larger than to give about an inch of soil around the ball of the roots, put it into a half-shady place, water enough to settle the soil around the roots, and give no more water until new, vigorous growth commences ; the soil should be kept moist all through, but never wet for any length of time. Never use pots of a larger size than is absolutely necessary, and plunging them in cool ashes encourages root formation. One may readily enjoy a

succession of flowers all winter long by forcing a few at a time and replenishing as the bloom fades away. Hardy plants of every description dislike strong heat, preferring a cool, moist atmosphere, with plenty of air in mild weather and free access to the sun's rays.

For window culture, the plants should be started either in a cool greenhouse or sunny window in the domestic apartments, whence they may be removed to the living room as the bloom begins to appear. Give plants as much light as possible during the day, and darkness, with a lower temperature, at night. A uniform temperature of sixty to seventy degrees in the day time and forty to forty-five degrees at night will give the best results. Turning the plants towards the light should not be done unless done regularly.

Besides light, house plants require a good supply of fresh air. Ventilation is absolutely necessary.

Mr. HALL: What is the necessity for draining in new pots, or washing the leaves, or taking them from the window?

Mr. SCARFF: A great many persons are in the habit of giving too much water and thus drowning the plant out, hence the need of proper drainage. Washing the leaves is a great protection to those plants that have been raised in ordinary houses, where a certain amount of dust will always accumulate on the plants. I find it makes them much more healthy, and improves them very much.

Mr. GROFF: Gasoline does not affect the plants injuriously; I light my window with it entirely. Pots over four inches in diameter should be drained. The question of water is a vexed one among amateurs. The experience of the late Peter Henderson was that there was no difference between using hard or soft water as far as its effect was concerned. My own greenhouses and beds are all watered with hard water all the year round, and I am satisfied with the result; I obtain it from springs, being furnished by hydraulic rams.

Mr. HALL: You must remember that Mr. Peter Henderson did not grow his plants in the house.

Mr. GROFF: Of course a great deal depends on the soil.

Mr. LOCKIE: Does Mr. Groff use perfectly cold water in the conservatory?

Mr. GROFF: In a small house with the thermometer ten degrees below zero I have broken the ice and taken it in with the ice rattling in the cans and watered the plants of the house all winter with it. The temperature of the water would never be under forty degrees while the temperature of the house would be sixty at the time of watering. For a short time a portion of the soil in the pot might be reduced to the mean temperature of about fifty degrees which could not be injurious, and that would only be for a short time. I practised that for some years without an injurious effect.

Mr. W. E. SAUNDERS: The presence of lime makes the difference between hard and soft water. Lime being added to many soils is a great advantage; yet I would not recommend hard water as preferable to soft. The Creator waters his plants with soft water. (Hear hear.) I don't know that we could do much worse than follow his example. Suppose I forget to water a plant, and at eleven o'clock I notice it wilting, does Mr. Scarff mean that we should not water that plant while the sun is shining? It has five or six hours of sun yet to resist without water. It seems to me that refraining from watering plants when the sun is on them is like refraining from drinking when you are thirsty. If you are thirsty then take a drink. (Laughter.)

Mr. GROFF: I think Mr. Scarff's idea was that it should not be left until it required watering when the sun was shining. (Laughter.) I think the water that is gathered at the roots of plants may be considered hard water. During the early part of the past season we had no rain; all the moisture plants received was from this cold spring bottom, spring water certainly, and the result was most satisfactory.

Prof. ORAIG: Each gardener at the Experimental Farm follows with very great advantage the plan of using nitrate of soda just about the time the plants are coming into flower.

Mr. HALL: You will get the ladies to kill the plants if you give them that secret; they will give them too much. (Laughter.)

Prof. CRAIG: Dissolve one ounce of nitrate of soda in three gallons of water and use it about twice a week, and you will very readily notice the increased vigor of the plant and the luxuriant foliage you will have on them. It is one of the best tonics for geranium, than which I don't know any house plant better suited for cultivation and that will stand more abuse and give more flowers; I don't think that the geranium is appreciated sufficiently by our flower-loving public and by the ladies.

Mr. GROFF: The whole question of watering may be summed up in this: The man who knows how to water knows it all, because on watering too much or too little the whole success of the plant depends. Over-watering will kill just as much as under-watering.

The SECRETARY: Mr. Saunders has a very large collection of house plants; I think we would like to hear something more from him.

Mr. SAUNDERS: I think it is better to use water in winter that does not produce a sudden change. I have been using city water in my conservatory; it comes to us at a temperature of about fifty-five, or fifty and I have attributed to the temperature of the water the fact that the plants have not come on as I thought they should, and I am about now to introduce a mixture of hot and cold until I get a medium temperature. I have been thinking that for spraying plants perhaps too warm water can hardly be used provided it is put on with a fine spray. Passing through the air it must lose almost if not quite all its superfluous heat, and reach the plants just in a gentle medium temperature which we might liken to that which the rain has on a warm spring morning.

Mr. DUNN, (Woodstock): Would it not be a good idea to take the flowers in the shed and water them there, if they suffer from the sun's rays.

Mr. GROFF: It has been claimed by the best experts that nothing is to be gained by warming the water, and that there is no necessity of doing it, or of watering with soft water, unless it is as convenient as hard.

Mr. LOCKIE: I erected a small greenhouse last fall, and put up a tank pretty well elevated, and leave the water in there until it becomes the same temperature as the house, and I think that succeeds very well.

GARDEN AND HOUSE PLANTS.

The PRESIDENT: Our next subject on the programme will give hints on growing garden and house plants by Mr. Fred Mitchell.

Mr. FRED MITCHELL of Innerkip, before reading his paper said: As an amateur and a professional I have had a life-long acquaintance with the subject under discussion, but I long ago discarded the custom of placing broken potsherds in the bottom of the pot for drainage, I found that if the earth was not of a fibrous nature there soon would be no drainage at all, that earth, when it is watered heavily will fill all the crevices in the pieces of pot which you place in the bottom. The drainage I use is the fibrous roots which I sift from my compost heap—a portion of the roots of the sod. These I place in the bottom of the pot, and I find it is the best drainage I can get. As it decays, if it does not become more open, it counteracts the washing down of the earth, and in pots with that drainage enough of the drainage remains till the plant is to be potted again no matter if that may be a year. I agree with Mr. Groff that one of the most important things in successful plant raising is correct watering. It is one thing which I have never had yet and I have as good men and boys in my employ as anyone has, but I have never been fortunate enough to secure one that fully understood watering plants. Anyone who has the knowledge naturally to define the amount of water that a plant needs will

generally be a successful plant grower in any part of this world. As to temperature of water, the only heed I have taken was that if the temperature of my house was already low I was careful not to use cold water and make the temperature still lower; if the temperature is high I have never been particular if the water was cold; if the temperature was overly high I considered it might even do good in a measure by counteracting it. I have known people when their plants would be frozen in the open air to put water on them. I have advised them constantly against this. This year, at the time of the severe frost some parties determined to prove whether I was correct or not, and they watered portions of their plants and left others unwatered; some sprinkled water even on black currant and raspberry bushes and they turned white as if a fire had passed over them, while the plants that had been left unwatered recovered their usual color. I shall just give you this advice, never water a frozen plant. Mr. Mitchell, then read his paper as follows:

As I noticed sometimes plants subjected to unnatural treatment, or placed in situations uncongenial to them, and where, perhaps, some other plant would give to the grower a far larger measure of satisfaction, I thought possibly such advice as I could give on these heads regarding some of our commoner plants might be more useful than the somewhat uncertain information I could give relating to newly introduced plants.

There are also general questions which I am frequently asked as to the reasons for failure, and the way to success in plant growing, answers to some of which I will endeavor to include.

I will commence with the GERANIUM, perhaps the best-known flowering plant of all. There is very little advice to give regarding it. A larger general measure of success is attained with it than with any other flowering plant. It is not exacting in situation or treatment. One of the very few mistakes made with it in open air planting is that some persons thoughtlessly use too many varieties. In prominent situations, where planted for display, this spoils the effect. One variety in a bed produces the most striking effect. For this purpose no other variety yet introduced equals the well-known *Heteranthe*, or, as it is often called, "*Double General Grant*." *Bruant* is a much recommended variety of the same type and of nearly the same color. I find it to be not of nearly so good a constitution. *S. A. Nutt* is the best very dark-flowered variety for the garden. White and light-flowered varieties are never a perfect success in the open air. *Mrs. E. G. Hill* is one of the best salmon-colored varieties for the garden. There are very many varieties equally useful for pot culture.

There is perhaps no other plant of which so many are yearly bought and with which so small a measure of success is attained as the large-flowered FUCHSIA. The fuchsia is not exacting in the matter of soil or even in the amount of water it receives, but it is imperative that the temperature should not vary excessively and particularly that it should not run extremely high. As a spring and summer flowering plant for a cool conservatory it is very useful. I have attained the highest degree of perfection with these large-flowered fuchsias by placing the plants when commencing to bloom far from the glass on a low bench or on the ground itself, where the temperature is moderately low and even. In such a situation these plants are very beautiful. The variety known as *Storm King* is the most easily managed of all the large-flowered fuchsias. The smaller-flowered varieties, which have been less improved from their original species, are many of them plants of easy management.

The large-flowered *Cannas*, of which so much was expected and promised when they came out a few years ago, have not been universally satisfactory. Failure, I notice, is generally due to planting in shaded situations or insufficiency of water during dry terms. *Cannas* require an open sunny situation and plenty of water artificially applied in the absence of rain.

The plant known as *Caladium esculentum* requires the same treatment and situation as the *Canna*.

A plant which used to be a common garden plant, and which, when I was a boy, I used to see a striking object in the garden plots of that day is *Monarda didyma*. It is

very showy when in flower, and remains in bloom a long time. It is an excellent plant for the background of a lawn or among trees skirting a driveway. It is one of the very few plants which will flourish under the shade of trees. It is a native plant and is generally found on cool moist banks in partial shade. It is becoming rather rare.

One of the very best summer conservatory plants, and perhaps the least understood, is the *Tuberous Begonia*. In its variety of form and color it is a brilliant display in itself throughout the whole summer. The greatest and brightest display can be secured by it alone if properly managed. Like the fuchsia, a rather low and even, summer temperature is necessary to the most perfect results.

The glass should be whitened or shaded in some way as soon as hot, bright weather may be expected. As for most fine rooted plants an open porous soil is the best, but success may be attained with it in soils quite different from this, if the temperature is kept right. The bulbs can easily and safely be kept through the dormant season in any cool cellar. Some would-be authorities tell us the temperature should never go below fifty in the place in which the bulbs are stored. There is nothing in this; a low temperature is in no way injurious, if it does not go below the freezing point.

Enquiries are often made of florists for plants which will withstand the effects of coal gas. I may say, as I have often said, that there is no plant to which coal gas is not, more or less, injurious. Plants with hard coriaceous leaves do not so quickly show the effects of it. Neither do plants, which remain inactive for a period, show immediate effects of it during the period of their inactivity. But to all plants coal gas is poison, slow or quick, according to their nature or to the condition in which they may be when subjected to it. Plants grown by florists when first removed and subjected to ordinary dwelling-house conditions, will often (even if no coal gas be present) be affected in appearance by the change to greater or less degree. The usual reason for this is that the air in the dwelling is drier than it is in the greenhouse. If the dryness is not extreme the plant will soon accommodate itself to its new conditions. But if the air be so dry as to be of a burnt or kiln-dried nature the plant will never flourish.

Enquires are often made as to the amount of water house plants should receive. A general rule is that water should be sufficiently withheld to allow admittance of air to the roots every two or three days at least. Saucers which are often used in dwelling-houses under the pots should only be used to catch such water as may drain from the pots when watering. The only common plants which will thrive with the saucers constantly filled with water are Sedges and Oallas.

There are no hard and fast rules for the management of plants. He or she will be the most successful who makes a study of the general and individual nature and necessities of plant life.

Mr. GROFF: I would like to ask Mr. Mitchell if his reference to tuberous begonias referred to them as house plants, conservatory plants or bedding plants.

Mr. MITCHELL: I referred to them as conservatory plants, but I have experimented with them also as bedding plants, and I have not personally found them altogether successful. I have seen them growing to perfection in the open air with others but they have not done so with myself. They do the best in the open air or in places moderately sheltered, or where they do not receive much wind. It seems as if they cannot abide heavy winds.

Mr. J. CAMERON: Do you recommend putting pots in the sand for the purpose of keeping them damp?

Mr. MITCHELL: It certainly will do them no harm, and I think it might be some benefit. I believe that there is only a small portion of the people here who have seen the tuberous begonia at its best; it is most beautiful indeed, and makes a perfectly grand display. A summer conservatory with nothing in it but tuberous begonias can be made as bright and beautiful as it is possible to make it. (Hear, hear).

Mr. PARKER: Was not the injury that was done to these frozen plants with water done by watering at an improper time? If they were frozen during the night

and you allowed them to get the air too warm it seems to me the water might assist in extracting the frost from them, but if it was done a little too soon or a little too late of course it would be a serious injury.

Mr. MITCHELL: I think it would not possibly injure the plants so much if the water was put on in the way we have been told to-day was the proper way of spraying, that is, to fall in a light spray; but anything in contact with the plant that puts it in motion when it is frozen is sure to injure it. If any animal step on frozen grass it will leave a dead spot.

The PRESIDENT: We have with us two delegates representing the Michigan Horticultural Society, who will convey to us fraternal greetings from their Society.

Mr. RICE: Many people in Canada know of our state because it is the home of their children and friends. The State of Michigan would reach from Sarnia to Montreal and from Port Huron to Lake Ontario. We have more than one-half as many inhabitants in Michigan as you have in all Canada from ocean to ocean. It is the horticultural society of this grand state which sends you greetings to-night. Among the happy events of my life that I love to look back upon are the times when I have been privileged to meet with the bright men of this Association in the past. I think you know how to use people well, and you have such a studious disposition in studying all your work. Before I came to Woodstock I was told by a party who used to live here that the town was a long way behind the times; but when I looked around your pleasant streets and homes to-day and visited your active workshops I asked myself, where would you be if you were up to the times? (Laughter.) I looked around for poor men's homes, but found pleasant cottages surrounded apparently with comforts, pleasant yards, and everything looking neat and tasty. When we went over to your College and saw the young men there learning habits of industry as well as habits of thought, I felt that we would soon reap the advantage from this; and why? Because Canada is to us the reservoir from which we draw our young people. (Laughter.) We are too busy in our country to raise up large families of children, but here in Canada you have the reputation of raising the finest hogs, sheep, cattle and horses in the world; and why not raise the finest stock of the other animals? (Laughter.) Now if you are going to send that stock over to us, don't send scrub stuff; we have had enough of it. (Laughter.) My daughter after passing through this beautiful country around Woodstock and valleys around London and the Grand River, and those vineyards down about Winona, said to me: "Papa, I see now why it is that only the meaner class of people come from Canada to our country." I asked, "Why?" and she answered, "They have such a beautiful country that none but a mean man would leave it." (Laughter and applause.) It is often hinted that you would like to become part of the United States; but don't do it. (Hear, hear; and a voice, "Don't be afraid.") We know Michigan would be so eclipsed that we would have to sell right out and move down here, and you would become the greatest and grandest and most glorious spot on earth; no other spot would be so beautiful, so thickly inhabited, so filled with the industries of all sorts as this portion of God's footstool. No other portion is supplied with such water powers; you can manufacture for all the earth. Now just stay as you are; don't rival us too much; don't get too big. (Laughter.) Canada is often represented as our younger sister. Well, we are proud of her; she is a nice, spruce girl, and a pretty lassie. (Laughter.)

Mr. WATKINS: When our President at our last meeting asked me to go to the State of Illinois as a delegate I said no; then he said, "Go down to Indiana;" I said, "No, I don't feel like it;" but when he asked me to come over to Ontario, I said I would do that with the greatest pleasure. (Applause.) Some of you might wonder why. It is a very difficult route—I have to come four or five railways to get here. But the reason I came was that three or four years ago I had the happiness to be a guest of your Agricultural Society, and if I ever had a happy time it was then. I met a great many men that I have been very glad to have known—Frederick Stone, of Guelph, and the Snells, and a lot of people that were a delight, and I knew that I should come to just such another place here, and I did. I am happy to be with you to hear your bold and

careful and crystallized way of talking of subjects that you take up. You know that you have the future horticulture in your hands. There has been an allusion to annexation. I don't believe the people of the United States entertain the least idea of it. Not that they would not get the best people on earth, but we have had a bitter experience in our civil war in trying to hold down an immense territory. It would be a poetic thing to see this continent all governed by one people, but I think in the nature of things it would be impossible for any one government to hold so many classifications and environments and soil and conditions in one people. People are jealous, and politicians are tricky, and it would make trouble, and it would cause wars and bloodshed, and injure all parties. The best thing for us is a genuine, square, honest, fair, fraternal reciprocity. (Hear, hear, and applause.)

The meeting, which had been enlivened by several musical selections, closed with the national anthem at 10.30 p.m.

THIRD DAY—MORNING SESSION.

The Convention resumed at 10 a.m.

On request of the President, Mr. McNeill read the report of the Nominating Committee.

THE OFFICERS FOR 1896.

President, M. Pettit, Winona, *Vice-President*, W. E. Wellington, Toronto; *Secretary-Treasurer and Editor*, Linus Woolverton, Grimsby; *Directors*: W. S. Turner, Cornwall; R. B. Whyte, Ottawa; George Nicol, Cataragui; Wellington Boulter, Picton; Thos. Beall, Lindsay; R. L. Huggard, Whitby; W. M. Orr, Fruitland; A. M. Smith, St. Catharines; J. S. Scarff, Woodstock; John Stewart, Benmiller; T. H. Race, Mitchell; Alexander McNeill, Windsor; G. C. Caston, Craighurst. *Auditors*: A. H. Pettit, Grimsby; George Fisher, Burlington. *Representatives on the Board of Control of the Ontario Fruit Experiment Stations*: Messrs. W. E. Wellington, A. H. Pettit and A. M. Smith.

The Report of the Nominating Committee was adopted as a whole.

The PRESIDENT: I thank you for the honor you have done me in electing me for a second term, and I only ask for a continuance of the kind assistance and consideration I have received at your hands during the past year. I assure you that I shall do all in my power to forward the great industry that we have here represented. (Applause.)

REPORTS OF EXPERIMENT STATION BOARD.

The SECRETARY: The operations of the experimental stations are so extensive, and the report is so bulky and so much in detail, that it would exhaust all the patience of the members to hear it read.

Mr. A. H. PETTIT: As this report is so bulky and will be published in our annual report, I would suggest that we pass it over, as we have so much to be done at this session.

TREASURER'S REPORT FOR THE YEAR 1894-5.

RECEIPTS.		EXPENDITURES.	
	\$ c.		\$ c.
Balance on hand Dec. 1, 1894.....	140 87	<i>Canadian Horticulturist</i>	1,666 95
Members' fees	2,477 47	Salary Secretary-Editor and assistant.....	1,200 00
Government grant.....	1,800 00	Cromo lithographs	272 00
Advertisements.....	243 62	Plant distribution.....	262 24
Binding and bound volumes	34 47	Directors' expenses.....	238 98
Back numbers, etc	11 02	Commission.....	231 78
		Affiliated societies.....	191 52
		Postage and telegrams.....	152 23
		Express and duty.....	113 14
		Printing and stationery	105 91
		Stenographer	80 00
		Illustrations	57 20
		Committees	54 85
		Binding of volumes	34 69
		Advertising.....	24 36
		Discount	19 98
Amount due Treasurer Dec. 1, 1895.....	0 38	Petty cash.....	2 00
	\$4,707 83		\$4,707 83

We, your auditors, have carefully examined the books and vouchers of the Treasurer and find them to agree, and that they are most neatly and correctly kept.

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

REPORT OF FINANCE COMMITTEE.

Your Finance Committee, having examined the Treasurer's accounts, have pleasure in testifying that the payments made during the past year were justifiable in the best interests of the Association, and in accordance with the objects for which our Association exists. But, in consideration of the fact that we have overdrawn our account, we would recommend that in future all paid delegations and committees sent out be as small as is consistent with the best interests of our Association.

A. M. SMITH,
W. M. ORR.

On motion of Mr. Pettit, the Auditors' Report was adopted.

REPORT OF SECRETARY, 1895.

The membership of our Association during the past year has considerably increased. Last year the total number of paid members was 2,104, this year it is 2,472. As you will see from the Treasurer's report, the gross receipts from members' fees this year has been \$2,477.27, and the commission allowed on club lists amounted to \$231.78.

This increase has been in a large degree due to the praiseworthy efforts of our director for district No 5, Mr. THOS. BEALL, who, a year ago, laid before us his scheme for enlarging the work of our Association in a paper read at the last annual meeting, and probably no man could be better fitted to do this work than Mr. Beall. He is methodical in his work, and knows how to approach the prominent men in each locality in such

a way as to insure their confidence in his proposals. Through his efforts the following affiliated horticultural societies have been formed :

Niagara Falls South, 100 members; Woodstock, 94 members; Lindsay, 90 members; Paris, 67 members; Port Colborne, 61 members; Brampton, 63 members; Port Hope, 75 members; Waterloo, 70 members; Trenton, 60 members; Napanee, 58 members; Grimsby, 58 members.

I believe that it is the true way of enlarging the work of our Association, because it means a large number of local organizations in closest sympathy with our work.

You will be interested in knowing what was done in the spring of 1895 in the way of plant distribution. The following is a list of the plants distributed :

Pearl gooseberry	1,164	plants.
Green Mountain grape	336	"
Rosa rubifolia	381	"
Cotoneaster Vulgaris	155	"
Gabriel Luizet rose	99	"
Sarah raspberry	88	"
Douglas Fir	65	"
Pinus Ponderosa	57	"
Strawberries (sets of four plants)	18	"
Smith's Giant raspberry	3	"

These were wrapped with more care than usual with damp moss in oiled paper and an outside wrapper of heavy paper. They were mailed as fast as ready, the last being mailed on the 11th of May. It would appear that this distribution has given more than usual satisfaction, nothing but words of appreciation and satisfaction being received from subscribers. I have taken unusual care to have everybody pleased, because in time past there has been a good deal of complaint. In cases where no plant has been chosen by the subscribers I have sent them such plants as I thought would be acceptable. Our special thanks are due to Professor Wm. Saunders, Director of the Central Experimental Farm, Ottawa, to whom we are indebted for a large proportion of the stock sent out.

It is a question for us to consider in the near future, if not at this meeting, in what manner we shall continue the plant distribution. It is experimental work of a slow kind. The reports are scantily made and the chief good of work consists in scattering far and wide valuable new varieties of fruits or flowering plants. I would suggest that the experimental part of this work be entirely given over to the Board of Control of the Ontario experiment stations, and that only such stock be distributed among our members as from time to time is proved to be of value, either by our own stations or by the Dominion experimental farms, or as may for other reasons be considered worthy of distribution.

The printing of the journal is still done by Messrs. Dudley & Burns, of Toronto, and the average expense, including engravings, has been \$125 per month, not including colored plates. The work is well and faithfully done, though occasionally behind in publication. Sometimes this is my fault, and sometimes it is the fault of the printers, but I assure you I am trying my best to have it issued as soon as possible after the first day of each month.

The colored plates have been continued in most issues of 1895. I find a certain class of subscribers highly appreciate them, and I think it would be a great mistake to wholly discontinue them; still, with your approval, I propose in future to increase the number of engravings and lessen the number of colored plates, unless such lithographs can be secured as will more truly represent the actual size and coloring of our fruits than some of those which have appeared in the past. If our funds would permit, I would suggest the making of some original colored plates from nature, giving the true size and color of the fruits as grown in Canada. These would prove of value, and would add much to the high standing of our journal and of our reports in foreign countries. As an

example of the good work that might be done in this line, I would refer you to the fine plates, true to nature, which illustrate the "Bulletin of Agriculture and Floriculture," published in Gand, Belgium.

With all economy, I find it a great difficulty to keep the balance on the right side. We need more money for our work. Our industry is the most important one in Canada. The dairymen have received an addition to their grant, and we are quite as well entitled to it as they are. Our directors should have more than bare expenses; our journal needs additional expense put upon it, and lecturers should be sent out to affiliated societies.

I would suggest that a committee be appointed to interview the Minister of Agriculture on this subject, asking that our grant be increased for the purposes above mentioned.

This report was received and adopted.

REPORT OF NEW FRUIT COMMITTEE.

D. W. BEADLE: The New Fruit Committee are able at this meeting to give you a verbal report. Owing to the frosts the number of seedling fruits and new fruits received this year has been comparatively very few. I took some pains to communicate with all who had sent new fruits to this Association in years past, writing over a hundred letters, and I have received replies from some of them. Anything of any importance will be detailed in the report which I will prepare and send to the Secretary.

Letters were sent to all those who had, previous to 1894, sent samples of seedling fruits which had been favorably mentioned in the reports of this Association, but owing in large measure to the frosts of May subsequent to the very warm weather that had forced vegetation into unusually rapid development, comparatively few were able to comply with our request to be favored again with samples of these fruits.

Notes were carefully made of such as were received, a synopsis of which is herewith presented as follows:

From Mr. J. C. Bull, Weston, Ont., were received samples of apples grown from seed of the Rambo, the trees all of the same age, somewhere between thirty and forty years. These were sent to Mr. Craig, but the letter describing them was sent to the chairman, which stated that the fruit was also mailed to him. After waiting some days without any tidings of the fruit, and not having received any reply to his inquiry whether the fruit had been sent, the chairman sent Mr. Bull's letter to Mr. Craig, and shortly after learned from him and from Mr. Bull that the apples had been sent to Mr. Craig and that he had been waiting to learn whence they came. Owing, probably, to this delay notes were not taken by Mr. Craig of all of the numbers. Those taken are dated September, 1895.

No. 1. Size, medium; form, round, regular; skin, yellow, with faint blush, and interspersed with numerous black dots; stem, large, slender; cavity, broad and smooth; calyx open; basin shallow, wrinkled; flesh, yellowish, juicy, melting, pleasant sub-acid; rather promising. Mr. Bull says No. 1 is smaller than usual, the tree a good bearer, but rather delicate.

No. 2. Mr. Bull says the tree is very productive and hardy, the fruit usually larger than sample sent. No notes by Mr. Craig.

No. 3. Size large; form, roundish conical, regular; skin, greenish yellow with numerous dots; stem, moderately stout; cavity narrow and deep; calyx, open, basin shallow, roughly wrinkled; flesh, white flaky, juicy, quality good, sharp sub-acid; texture, rather tough; decidedly promising; more color wanted. Mr. Bull says fruit fairly represented by sample, tree hardy and productive.

No. 5. Mr. Craig notes it is not as valuable as Nos. 1 and 3; smaller, more conical, with stripes; quality medium. Mr. Bulls says, "a hardy tree, bears very well, but not so heavy as some of the others." He also says No. 4 is very hardy and productive; No. 6 a good bearer and hardy, fruit sweet. But no notes appear to have been taken by Mr. Craig of Nos. 2, 4 and 6.

Seedling apple from W. H. Leef, Orillia, Ont., October 4th, 1895. Description taken from Mr. Craig's notes. Size, medium; form, oblate, somewhat irregular; stem, not mentioned; cavity, broad, moderately deep, russeted; calyx, not noted; basin, shallow, somewhat irregular; flesh, yellow, juicy, mild sub-acid, pleasant, fair quality; season, October and November. Fairly promising. No mention of the tree.

Seedling apples from Watson Griffin, Montreal, October 5th, 1895.

No. 1. Shiwawsee Beauty type. Size, large; form, oblate; skin dark crimson. Much overripe, October 10th.

No. 2. Probably Autumn Strawberry or founding. Exact in taste and appearance. Now over-ripe, October 10th.

No. 3. Like Westfield Seek no Further. Size, medium; form, oblate; skin, dark green interspersed with crimson markings; flesh, juicy, brisk sub-acid; season, midwinter. Promising.

No. 4. Size, large, Alexander type; skin, greasy, overspread with purplish red; flesh, yellowish white, tender, juicy, melting, sub-acid; quality good, much better than Alexander. Worthy of further trial.

Such are Mr. Craig's notes on these apples from Mr. Griffin.

Seedling apples from C. H. Roberts, Paris, Ont.

Harold. Size, medium to small; form, oblate with conical tendency, regular; skin, smooth, glossy, with bloom, dark crimson, with greyish, russet patches near the cavity; stem, short and stout; cavity, broad and moderately deep; calyx, closed; basin, small; flesh, white, firm, somewhat pithy, juicy, but not strikingly so, sub-acid, quality, medium to poor. Season Christmas.

Percy. Small, resembling Longfield in size and appearance, but somewhat tough and woody in texture.

Charlie. A small, crab-like apple of bright, attractive appearance and good quality and a keeper, but too small. Such are Mr. Craig's notes of Mr. Robert's apples.

Seedling apples received from Mr. McD. Allan, Goderich, Ont.

Breckenridge. Mr. Allan says grown by John Breckenridge, Goderich, a great bearer, long keeper, and towards spring of excellent quality. Resembles Northern Spy. Size, medium to large; form, approaching oblong; ribbing, very obscure, sometimes wanting; skin, yellowish green, partly covered with stripes and splashes of red, thick and tough; stem, slender; cavity, deep and broad; calyx, open; basin, shallow, almost wanting; flesh, white, flaky, juicy, sub-acid, with Northern Spy flavor; said to keep all winter. Worth cultivating.

Jordan. Russet type. Size, eight and one-quarter inches in circumference, two and one-half inches long; form, regular, roundish oval; skin, greenish yellow, thinly covered with light russet, with russet more dense in numerous patches and sparsely sprinkled with grey dots; stem, three-quarters of an inch long, moderately stout; cavity varies from broad and shallow to deep, narrow and lipped; calyx, prominent and closed, occasionally open with broad segments; basin, shallow, smooth; flesh, a greenish yellow, fine grained, moderately juicy, breaking, mild sub-acid, rich, pleasant, quality, very good, resembles Pokeepsie Russet in flavor; season, late winter. Deserves attention. Mr. Allan says: This apple is grown by F. Jordan of this town. It is a long keeper and of fine quality when ripe. It will easily keep till June.

Seedling apple from Milton G. Bruner, Olinda, Ont., who suggests for it the name Ella. Size, medium; skin, yellow, striped with red and crimson; flesh, white, melting, moderately juicy, mild sub-acid, quality fair; season November to January.

Two Seedling apples from Thos. Connolly, Lindsay, both yellow, fairly attractive in appearance, but not good enough to be commended for dissemination. Notes of Bruner's and Connolly's apples by Mr. Craig.

Seedling apples from J. Cuppage, Orillia.

Pioneer, No. 1. Size, medium to small; form, roundish conical; skin, yellowish green, with a ruddy check, and thickly covered with irregular russet dots; flesh, yellowish white, not juicy, mild sub-acid, quality poor; season, early winter.

No. 2. Size, about ten and one-half inches in circumference; form, oblate; skin, mostly covered with light red, abundantly streaked with deeper red and sparsely sprinkled with very minute specks; flesh, yellowish white, almost coarse, juicy, sub-acid, quality poor.

McLeod, No. 3. Size, medium to small; poor in quality; seemingly a November apple not worth disseminating.

Diamond, No. 4. Size, medium to small; form, oblate; skin, greenish yellow, thinly mottled and splashed with red in the sun; flesh, white, slightly tinged with greenish yellow, coarse, moderately juicy, very mild, sub-acid, not rich but pleasant; quality not good enough to warrant its dissemination.

Kean's Seedling, grown by Rev. Thomas Williamson, Orillia, sent by Mr. G. H. Hale, Orillia. Size, medium, nine inches in circumference and two and one half inches high; form, conic oval, slightly oblique; skin, for most part a purplish red on yellow ground, mottled and splashed with a darker shade, thickly sprinkled with light grey specks, which appear almost white in contrast; stalk, three-quarter inches long; cavity, deep, nearly triangular, slightly lipped; calyx, open, segments long pointed, reflexed; basin, large, of moderate depth, slightly wrinkled; flesh, yellowish white, moderately juicy, flavor without character, quality poor.

Two apples from Franklin Crandall, Lindsay, Ont. Received December 6th.

Red Rock. Tree, a seedling, hardy; fruit, size medium; form, conic oblate; skin, light yellow, overspread with red, splashed with deeper red and sparsely sprinkled with small whitish dots; stalk, very short and stout; cavity, broad, deep, slightly russeted, and irregular in outline; calyx, small, segments short, open; basin, irregularly corrugated, broad, of medium depth; flesh, yellowish white, coarse, juicy, sub-acid, quality not quite good; a good keeper, but apt to rot at the core.

Empress. Tree came up on a spot where a Baldwin was once growing, it is now fifteen years old, has been in bearing ten years, bears every year. In 1894 the crop was three barrels, in 1895 was seven barrels. It is a free grower and extremely hardy. Fruit, above medium, ten inches to ten and one-half inches in circumference; form, oblate, flattened at both ends; skin, greenish yellow, with a solid carmine blush where exposed, splashed with deeper shade and thickly sprinkled with minute dark brown specks margined with green; stalk very short, and stout; cavity, broad; moderate depth, slightly russeted around the base of the stalk; outline irregular, with a slight lip; calyx, open; segments, broad and short; basin, broad and deep, not wrinkled but somewhat irregular and precipitate. Flesh, nearly white, almost fine grain, mild, sub-acid, juicy, pleasant flavor; quality very good; core, small. Mr. Crandall says the fruit is at its best about April when kept in a cool cellar. A very promising variety, worthy of further trial.

Apple from Mr. John Miller, Markham, Ont. December 14th, 1895. Tree forty years old, was growing on the farm when Mr. Miller took possession twenty-eight years ago; is healthy and a regular bearer. Fruit, of medium size; form, roundish oblate; skin, smooth, yellow, red on one side, and splashed all over with bright red; stem, very short, not very stout; cavity, deep, narrow, smooth, lightly russeted; calyx, closed, segments, broad and short; basin, shallow and uneven; flesh, yellowish white, fine grained, juicy, mild, sub-acid, pleasant flavor; quality good; core medium, seeds very plump; season, December and January. An attractive apple, no better than others of same season now in cultivation, but may prove valuable in some sections on account of the hardness and productiveness of the tree.

The following descriptions are from notes taken by Mr. Craig. For varying reasons Mr. Craig was not able to forward samples of all of the fruits received by him to the other members of the committee, therefore in such cases the description given is credited to Mr. Craig, from whose notes they are taken.

Seedling apple from A. W. Forfar, Ellesmere, Ont., reported in 1869 by Fruit Growers' Association of Ontario. Fruit, of medium size; form, oblate conical; skin, a clear golden yellow, with a diffused pink blush; stalk, slender; cavity, broad, moderately deep and slightly russeted; calyx, open; basin, shallow and plaited; flesh, white, flaky, moderately juicy, firm, mild sub-acid, with sweetish after taste, flavor pleasant, good to very good, core small; season, September and October. In good eating condition September 24th, 1895.

Seedling apple from Mr. Seth C. Wilson, Whitby, Ont. Fruit, of medium size; form, roundish, ribbed; skin, greenish to yellow with dark dots; stalk, short, one-half to three-quarters of an inch; cavity, deep and smooth; calyx, open; basin, ribbed, small and deep; flesh, white, crisp, juicy, brisk sub-acid, breaking, flavor pleasant; season, August. Resembles in a general way Grimes Golden, with less regularity.

Seedling Plum, from Allen Bros, Winona, Ont., August 9th, 1895.

No. 8. Examined August 24th. Fruit of medium size, form egg-shape, skin green. Too badly shrivelled to gain an idea of the quality.

Seedling Peaches, from H. A. Bailey, Amherstburg, Ont. Both samples in poor condition. September 20th, 1895.

No. 1. Overripe when received; one of them quite decayed, but apparently of good quality.

No. 2. A clingstone, of fine appearance, but watery and of poor quality.

Scions of the most promising varieties, above noted, have been secured by Mr. Craig, and root-grafts will be available for distribution next spring to the experimental fruit stations.

Committee : { D. W. BEADLE, Toronto,
Chairman ;
JOHN CRAIG, Ottawa, Ont. ;
A. MCD. ALLAN, Goderich.

REPORT OF COMMITTEE ON FRUIT EXHIBIT.

Your committee appointed to examine the fruit exhibit upon the table have to report that they find a very fine display of old and new fruits made by Mr. W. H. Dempsey, of Trenton. Among his new apples worthy of note we observe a medium sized roundish, dark red one, very handsome, somewhat resembling a Spy—a cross between that old variety and Golden Russet. Also another cross between those two varieties, named Walter, previously shown at Peterborough and described in the report of that meeting. In his exhibit are also seen very fine specimens of Hubbardson's Nonesuch, Westfield, Ontario, Newtown Pippin, Lord Burleigh, McIntosh Red, Stark, American Pippin, etc.

Mr. W. S. Turner, of Cornwall, shows a handsome plate of Gideons, and some very fine McIntosh Red, La Rue, Wealthy, Red Bietzheimer, Canada Baldwin, and specimens of a few other older varieties.

Mr. A. M. Smith, St. Catharines, shows the Princess Louise apple, six varieties of pears and well preserved samples of the Niagara and Vergennes grape.

Mr. L. Woolverton, of Grimsby exhibits a very fine sample of Cranberry Pippin, Blenheim Pippin and Princess Louise.

Mr. H. Jones, of Maitland makes an attractive display of ten varieties of apples, among them the Red McIntosh, an extra fine Fameuse, a fair sample of La Rue, Pewau-

kee, Ben Davis, Wealthy, Longfield, Blue Pearmain, Scott's Winter, and a handsome seedling named Scarlet Pippin. The latter is a handsome, reddish, medium sized and very attractive apple of fair quality.

Another attractive exhibit is one by Prof. Craig, of Ottawa, brought from the Experimental Station in British Columbia. Among this exhibit are large-sized specimens of the Vaudevere, Stark, Mann, Ribston Pippin, Twenty Ounce Pippin, etc. Prof. Craig also shows a number of varieties grown at the Experimental Farm, Ottawa.

Mr. L. B. Rice, of Port Huron, shows a sample of Ben Davis grown in Missouri, which seems to be matured much in advance of the same variety grown here.

Mr. W. Newton, of Woodstock, exhibits some samples from a tree bought for the Newtown Pippin. The samples resemble, slightly, that variety in shape and color, but not at all in quality or season.

Mr. R. L. Huggard, of Whitby, shows a seedling which he claims to be a long keeper, and the tree a regular and heavy bearer. The apple is of medium size, of the Colvert form, but does not appear to have much quality.

T. H. RACE, }
G. NICOL, } Committee

The SECRETARY thought it would be well for Mr. Race to call attention to anything specially worthy, and let the details come in the printed report.

Mr. RACE: the only thing that the committee have to report specially are some of those seedlings shown by Mr. Dempsey. He has shown some very fine results from crosses between the Northern Spy and the Russet. The peculiarity of these apples is that they have the characteristics of the Spy partially; however, they are very fine samples. The next very nice exhibit is shown by Mr. Turner, and some very fine specimens shown from British Columbia. The specimens that were shown from the Experimental Farm at Ottawa we have said very little about. They don't come up at all to the apples produced of a similar variety farther west. Special mention should be made of the apples shown by Mr. Jones from the St. Lawrence district, called the Scarlet Pippin; it is a very handsome apple, medium size, of fair quality. Mr. Jones reports that it is a very salable apple down there, and one very much in demand. We cannot say that it would be an apple that should be very largely cultivated except for its appearance; and as Mr. Dryden represented to us here yesterday afternoon, it is quality that is going to tell in the long run in the British market and every apple market, and that has been my view for a great many years. A little flash and show may take for a time, but this apple has the qualities to recommend it for a long time.

Mr. HUGGARD: I would like to hear the committee's opinion of this seedling I brought from Whitby.

Mr. RACE: There were two or three seedlings placed on the table which we could not say anything about. They are only medium in size, and they are not very well up in quality. There is not one of the seedlings shown that would commend itself very much. We don't think it is advisable to recommend the introduction of any of these new seedlings unless they come quite up to or a little above the varieties now in cultivation. We have some splendid apples now, the old standard apples, and have such a variety of them that we don't care to recommend the increasing of the number of varieties unless we can get a seedling that really comes above them in quality and every other character.

Mr. HUGGARD: The qualities of that seedling does not show itself till March.

Mr. RACE: It is not better than the Mann.

Mr. MCNEILL: Will it be more prolific than the Mann?

Mr. HUGGARD: It is a heavy bearer, and quite heavy enough for the tree to carry, and on account of its good keeping quality and its high flavor later on I thought perhaps it would be commended. It has a spreading habit, a very thrifty tree, free from roughness of any kind. I admire it very much in the orchard.

D. W. BEADLE: Would Mr. Huggard have the kindness to send about half a dozen of those apples about the time when they are in order and season for testing, and send a letter giving a full account of the tree, its hardiness, productiveness, and general habit of growth, and all the better if he can tell us something about the soil and average climate in which it is grown. He can send both the apples and letter to Prof. Craig at Ottawa, without charge, under a privilege granted us by the Government, and then Prof. Craig can send them to the other members of the committee and we will all get them without any cost to Mr. Huggard more than the trouble of putting them up and sending them, and the apple will get all the consideration that it deserves and a full report at some subsequent meeting of this Association.

METHODS OF ORIGINATING NEW VARIETIES OF STRAWBERRIES.

The SECRETARY referred to a letter from Rev. E. B. Stevenson of Freeman, who is a specialist in strawberries and who has spent his life in originating new varieties. From him in the future we will hear some interesting things that will be of great value to us in our experimental work. (The Secretary read the following extracts from the letter from Mr. Stevenson):

It seems to be there has been no systematic effort either in Canada or the United States by those who have had the time and means to improve the strawberry. I am very much limited in both respects; but I am in a small way and in a somewhat systematic manner seeking to improve on the varieties we have at the present time.

There are so many points to be looked to and guarded in what we all are looking for, viz., the "*Perfect Strawberry*." It has to be a perfect plant—strong and healthy. This is very important. The perfect plant must be free from rust. Some otherwise good varieties are spoiled by rust. A high system of cultivation, manuring heavily with nitrogen manures, serves to increase the tendency to rust; also certain conditions of the weather, situation of the beds, low lands, etc.

I have found very little rust when beds are situated on highest lands; whereas, beds on grounds seventy-five or one hundred feet below showed considerable rust. I have little confidence in a variety that is easily attacked by rust.

A seedling, a Wilson and Jersey Queen cross, that on elevated ground was quite free from rust, when it came to be removed to a lower situation, rusted so badly as to be of little value. On upland it was one of the most promising seedlings—productive, good size and quality, etc.; in fact, an improved Wilson. I have found that a large per cent. of seedlings of Wilson blood, or rather breeding—whether they are seedlings of the Wilson or seedlings of other varieties with Wilson crosses—are more or less severely affected by the rust. A lot of seedlings from Burr's New Pine, crossed with Wilson, nearly every seedling from this cross gave fruit of superior quality like Burr's N. P., but the plants fairly burned up with rust as soon as plants were through bearing.

Probably 1,000 seedlings grow the Wilson and Wilson crosses were undertaken with the hope to secure a Wilson jr., that should possess all the valuable qualities of the Wilson, (which for so many years caused it to stand at the head as a market berry) with the addition of increased size, improved quality and more vigorous growth. It is, perhaps, needless to say the result was failure. Perhaps the Wilson can be crossed on some pistillate variety and the result prove highly successful. I have decided not to make any more experiments, using the Wilson as a pollinizer.

I may never reach in the way of a seedling a variety which shall be my ideal of a strawberry, but I shall aim for it, and never cease to raise seedlings as long as I have the time and opportunity.

Had I time and opportunity I would cross named varieties with a view of ascertaining which kind and crosses gave the best results. Then I would select this stock, breed

in and in—seek to develop an inbred strain that would produce its valuable qualities from seed. A staminate variety from such a breeding could be used to cross an outside named kind (pistillate sort,) and the seedlings would possess to an eminent degree the qualities of the male parentage. These seedlings (the pistillate sorts) could be bred back again to the staminate sire or to some other staminate variety of the above inbred strain. I am sure wonderful results would attend some such systematic method of breeding, have seen enough to satisfy me that there are great possibilities in this line of plant breeding.

A man must have means and leisure to carry out such a line of experiments. It is a most fascinating line of study ; much more than the mere testing new varieties, most of which are only chance seedlings picked up in fence corners and taken from stumps and stone heaps.

After a few years of such systematic breeding I think we would give much more valuable results. The method I have used in the past is: I take up the plants, place them in six or eight-inch pots—I do this in the spring for seed bearing, in late fall for fruiting—crosses I make under glass so as to control their fertilization. When I have several staminate varieties that I wish to use pollen from, it is needful to keep these staminates in a separate chamber or in some place apart. In fertilizing a staminate with another staminate the stamens have to be removed a couple of days before the flower would naturally open. Then when open apply pollen. There is need to apply the pollen several times in order to ensure a thorough fertilization, and have smooth perfect-shaped berries.

There is pleasure in testing varieties of other men's growing, but there is far more pleasure, a perfect fascination, in raising and fruiting.

"*Pedigree seedlings*" of you own, not that we find a prize in every variety, but we do find such a wonderful variety, size, shape, color, texture, quality, etc., that we are lost in wonder at these new fruit creations.

I have often wished that I could give more time to this sort of experimental work, but I have other demands on my time, but I manage to do something in the line of sought-for improvement with what degree of final success remains to be seen.

REPORT FROM OTTAWA VICINITY.

The SECRETARY introduced a report by Mr. R. B. Whyte of Ottawa, Director for District No. 2 as follows :

As I cannot attend the meeting at Woodstock, I send on the following few brief notes of the condition of the fruit growing industry during the past season in this district.

The season opened very favorably, and if it had not been for the severe frosts in May which ruined the strawberry and gooseberry crops, and seriously injured the others, we would have had one of the greatest fruit yields on record. The previous winter was most favorable, not very cold, plenty of snow, and no thaws to uncover the plants and expose them to cold winds. The weather during the summer was a great contrast to that of Western Ontario. Hardly a week passed without copious rains, which, with abundant heat, induced a most luxuriant growth in every thing that escaped injury from frost.

The severe cold in the latter part of May, which was so disastrous all over the country, utterly ruined the strawberry crop in most sections in this district. In some localities there was a fair crop but my experience was that of the great majority of growers, all we got was a few quarts of nubbins, hardly a good berry in the whole plot.

Almost as disastrous was the effects of the low temperature on the gooseberry. For the first time in my twenty years' experience in gooseberry culture, such varieties as Downing, Houghton, etc., usually so prolific, failed to bear a good crop. Out of over

forty varieties, the only one that had anything worth picking was the Whitesmith, my ten bushes of that variety producing more than 140 plants of other kinds. Singularly enough, the American varieties suffered more than the more tender foreign ones. Downing, Pearl, Montana Seedling, Smith's Improved, and Houghton, were all alike bare of fruit. I hope after another season's experience in growing foreign varieties to report, through *The Horticulturist*, my experiments with over forty kinds.

Though so closely related to the gooseberry, the red and white currants were very little injured by frost. The crop, while not so good as the previous season, was very fair. Another year's experience has established the great superiority of Moore's Ruby over all others as the best red currant. In quality it is away ahead of any competitor, red or white, large in berry and long in bunch, many of them containing twenty-four berries in the raceme. It is a better bearer than Fay, and a much more vigorous grower. It is not nearly so well known as it deserves to be. Another variety that promised well is the Wilder. It is more acid than Moore's Ruby, but in every other respect it is a close rival.

Raspberries were very satisfactory this year. No small fruit grown in this district is so uniformly profitable, for the space occupied and the labor expended, they give a greater return than any other small fruit. Cuthbert, Golden Queen and Shaffer are the standard varieties here. There are probably more Cuthbert's grown than all other kinds put together. Some growers are finding the Shaffer very profitable. One that I visited last summer told me that it was more profitable than even Outhbert. At first the color was found fault with, but any one who tried it always wanted it again; the above three kinds are almost the only ones grown for market here. But for home use softer and sweeter berries are preferred, such as Clark, Herstine or Heebner.

Black caps or blackberries are very little grown, not being found profitable in this section.

Plums, of late years, have been a failure here. We have never been able to grow the *Domestica* type successfully. The winter cold is too severe, and our native red plums are so subject to rot and blight that they are being generally cut down. Our only hope now is in the Western Americana type, as De Soto, Weaver, Wolf, Wyant, Hawkeye, etc. These are being somewhat extensively planted, and have so far proved hardy and free from disease.

The only apples grown to any extent here are the summer and fall varieties, such as Tetofsky, Duchess, Yellow Transparent, Wealthy, etc. These were a very good crop, and unusually free from codling moth, scab, etc., though fire blight was pretty bad in some places.

Grapes were very generally a failure. They were almost as much injured by spring frost as the strawberry. Those that escaped the frost ripened perfectly—even such late varieties as Iona.

With strawberries, gooseberries and grapes a failure, and raspberries, currants and apples only an average crop, it has been a poor year for the horticulturist.

With a summer so favorable for growth and the dry fall inducing well ripened wood, plants of all kinds entered the winter in good condition and we hope for better results next year.

The SECRETARY: There is a report of the committee for the selection of judges who will be available for agricultural societies so that they might communicate with this Association for names. This report is not sufficiently matured for publication.

The PRESIDENT: When we adjourned yesterday afternoon it was announced that the important subject of our export trade in apples and other fruits would be taken up this morning. Mr. Shuttleworth is here, and I will now ask him to introduce the subject.

OUR EXPORT TRADE.

Mr. SHUTTLEWORTH: In dealing with the fruit I have always thought that the allied interests of the grower and the handler of the fruit could not be divested of mutual confidence. We cannot very satisfactorily take the place of both buyer and grower. We cannot here as growers act as sellers. Our interests as growers are such that they demand our personal attention; therefore there has to be some intermediary. There has to be a middleman; possibly he is a necessary evil. I probably represent one of those evils. I am here to define my position. I think, on the whole, we have enough honorable men in business who can be trusted to handle the interests of those who produce. I don't say that all men in business are honest, nor do I say that all growers are honest either. My experience extends over twenty years, since the time when, as a boy, I could look into the barrel, almost, I packed apples. I have handled them and watched them from beginning to end, and my experience many times has been bought very dear. I find that we have honest men and dishonest men in both departments. We ought to have mutual confidence if we are going to do business. I don't believe it is practical for our growers to be distributors of their products in the foreign markets, especially because they cannot be here to grow it and there to sell it at the same time; so we have to have an intermediary. The first thing we must understand is what is the consumer's demand. It is no use trying to force upon consumers, who are the buyers of apples, an article they don't want. It is pretty uphill work to give them a good article after they have been running in a rut, particularly the English consumer. He is not very apt to take on new varieties and say he likes them better than those he has had long experience with. If they ask for a Spy grow them a Spy; if they ask for a Ben Davis grow them a Ben Davis. We have made mistakes as growers in that we have tried to put upon the market an article that is not really required. You should understand the whole of the conditions that exist. I believe it has gone out in one of your reports that the Ben Davis is one of the best exporting apples. I say intrinsically the Ben Davis is nowhere, and as soon as the demand for that variety of apple is supplied then the surplus supply will have to be slaughtered. The Ben Davis is almost entirely used for show purposes. It is an apple that is not good enough to rot very easily. (Laughter). I won't say anything about the Missouri or Kansas Ben Davis—I believe that they are better than our Ben Davis; but to recommend the production of an apple which can only be used for show purposes would be a mistake—not that we will feel it so much as those that follow us will. The Spy is a superior apple intrinsically. It may not be so heavy in its yield, and it may not come into production so early, but it is an apple that will command a price and eventually drive all the other apples out of the market—the Pewaukee, for instance, which is not a good apple. We must take into account the fact that in European countries they are producing a better article every year. They are not asleep any more than we are. They are just as cute and just as shrewd and looking as far ahead as we are, and every year they are producing a better article and putting it up in a better shape. Last year we had twenty Frenchmen come over to examine the American packages to know how it was done and see the advantages of it; and they found that out. I believe, this year, they obtained our barrels, or barrels made in the same way, and put their apples upon the market exactly as we put ours upon the market. They are close to the market and they are also growing a good quality of fruit. I don't mean to say that their apples are as good as ours. I believe that we have some varieties of apples that are superior to anything grown in the world. I don't believe that they can produce the like of our Northern Spy anywhere—not in Denmark, where they produce good apples, or in Belgium or in Northern Germany. I have not seen any apples coming equal to our Northern Spys. As an illustration, I would ask if you had two barrels of apples, one a barrel of Ben Davis or Pewaukees and the other a barrel of Spys, and you had a family of boys and let them have free access to these barrels, how long do you suppose your boys would be in finding out which were the best apple? Now, if you think that the English consumer, who is willing to pay a good price for a good article, is not as capable of judging as your boy is, you make a grand mistake. I believe that we can produce the best varieties, and I don't think that we should look for immediate return. I believe we must look

for ultimate returns if we want to keep this trade, which is an important one. We produce more than we can consume ourselves, and our American friends don't want our apples except our Spys, and now and then they have a failure in a crop of other apples, but they are always asking for Spys, no matter how large their crop is; we all know from experience that the American demand is large for our Spys, and they will pay a good price for them. The Spys are worthy of it, and will, I think, meet a growing demand both there and also in Europe. Spys have not been quoted and sold as high this year as Baldwins in Great Britain, for the reason that most of the Baldwins that have been going forward have been very highly colored. The Baldwin is a better known apple than the Spy amongst the general public there, but the Spy is working its way up to the top and will stand where it deserves to stand, at the top, its intrinsic value being away ahead. The Newton Pippin from the Hudson Valley is the only apple that can compete with it; it is crisp and juicy and holds its flavor longer than any apple that I have seen. I have seen Spys in May and June that were as crisp and juicy as at any other time of the year and when other apples had lost all their flavor. With regard to the grading of apples, I contend, and have all along contended with our exporters of apples, that the proper way to do was to grade them No. 1 and No. 2 and sell them as such, and if they are not No. 1 the man who puts them up should be punished if it is possible to punish him. (Hear, hear). I say we make a mistake in trying to defraud the consuming population of Great Britain; we are only hurting ourselves ultimately as well as doing a wrong. A man who systematically defrauds the consumer over there will find that it does not take him long to wreck himself. They will look with suspicion whenever that man's brand is on the barrel if they have once been cheated, and I don't blame them for doing it. Very often I have been ashamed myself to see a packer with a good reputation destroyed because he has bought indiscriminately, and possibly he may have allowed his own men to put up fruit fraudulently, that is, they are falsely packed. I don't say but what we have plenty of men in the trade that pack honestly, and are getting the best market prices for their fruit. I believe the majority of our exporters agree with me, and will be quite satisfied that the apples should be graded No. 1 and No. 2 and sold as such. There is no need of any other way of going about it at all. Let the apples be sold as No. 1 or No. 2 and they will bring their prices. We have people there who are buyers of No. 2 fruit. The vast consuming population throughout Lancashire and Yorkshire have not the money to spend that people have in other places, and they will take a No. 2 apple and pay what it is worth. If we produce only No. 2 fruit we should expect only No. 2 prices. Now as to packages. Barrels seem to be, as far as I have seen, the only package in which we can ship apples to advantage. Packages have been tried from all points—from Lisbon, from France, from Belgium, from Denmark, and even from Tasmania. I think you will find boxes as a rule too expensive; I don't know what Mr. Woolverton's boxes cost him.

Mr. WOOLVERTON: Twelve dollars a hundred.

Mr. SHUTTLEWORTH: They hold about a bushel, that is thirty-six cents for three bushels, the cost of the barrel; what is the cost of the paper?

Mr. WOOLVERTON: Seven or eight cents a box, perhaps ten.

Mr. SHUTTLEWORTH: That makes it expensive.

Mr. WOOLVERTON: Then there is the expense of wrapping, probably about four cents a box.

Mr. SHUTTLEWORTH: That adds very materially to the expense. I believe myself that if we could keep the quality of our fruit extra superior, that that expense would be compensated by the increase of the price that we might obtain for fruit on the other side. However, if they all go into it, it will have its levelling effect. The barrel seems to me to be the most convenient package to handle fruit in. We have not seen anything that would take its place, taking cost into account. As exporters of fruit we must try, if possible, to reduce the cost of the fruit laid down in consuming markets; that should be one of our principal aims. In packing apples we know that it is necessary to press those apples. A good many of our apples are partially, if not wholly, destroyed by the pressure necessary to keep them in their places, that is in holding them down. The barrel is rolled;

if it is not tight and solid these apples will roll and bruise themselves until they come to be discolored with the rolling that they have had, therefore the barrels must necessarily be packed tightly so that they will hold without any movement at all of the fruit. That in itself destroys or disfigures a large number of apples, particularly adjoining the pressed end of the barrel. We have tried to overcome that. We have tried excelsior from Nova Scotia, and sometimes when the apple was decayed this excelsior got mixed up through the fruit, or sometimes when the fruit sweated, as it will sweat in barrels, this excelsior broke up first when it was dry and brittle and settled down through the barrels and this sweating made it adhere to the apples, and when they were turned out nearly every apple had to be rubbed off before it presented anything like a decent marketable appearance. We tried putting in paper heads, that is, I had some heads made about a quarter of an inch thick from paper pulp. These I got from Maine, and we had these put in barrels so as to prevent the necessity of too heavy pressure, and as the fruit shrunk or any of them decayed the paper itself would gradually press out again and hold the fruit in its place, thereby saving some of that loss which is necessarily entailed when the apples are pressed in without any heads. However, I have not found anything that I think is really practical. Paper boxes, that is, paper pulp boxes made with round edges, that is, pressed in squares, possibly will take the place, but I don't think we have yet got to that point where we can produce a paper box which will enable us to lay the apples down at the least possible expense in the Old Country—the box will cost too much money, something the same as our wooden boxes. We want to get a package which we will be able to sell there for some other purpose if we can. Second-hand barrels with the heads on, sell at about sixpence each, and that in a measure is taken into account when a man is buying the barrels—he knows when he turns out the barrel he can get sixpence for it. Then again, in the shipping of our apples there are faults in handling by the transportation companies. Apples are not handled very often as they ought to be handled. We have fought against them on this side and on the other side, claiming that they have not the right to handle the fruit in the way it was handled. I believe that now, through constant contention and striving with them, our steamship people are doing better than they have ever done before. I have myself stood on the bottom of a gangway and defied them to let the fruit down, so long as I stood there, in the way they were letting them down. They were letting a barrel slide down twenty-five feet, and I have seen them go down with a chuck that would burst the heads right out. After having a meeting of shipowners we have shown them that their interests as well as our interests and those of the producers on this side were intimately connected, and that they could not destroy the fruit in that way without injuring themselves; and we all know that the nearest way to get at a man's care of anything that we have to entrust to him is to get at him through his pocket. (Hear, hear.) He is more apt to respond to anything that is in his interest. I believe the steamship company now feel that, and in the last five or six years our trade has been handled better than ever before, and I believe that they will do anything in reason. That they will give us special space I cannot expect, because our export trade is of such short life that they cannot afford to put upon the route steamers fitted up for our trade. You could not ask them to do that; it is too expensive to run a steamer for three months and lay it up for the other part of the year. If anyone has an interest in steamers he will know how expensive it is and we cannot ask them unreasonable things. I would, however, ask and do ask that they would not put our fruit into a vessel which is unsuitable for carrying fruit. Many steamers have gone out with ten or fifteen thousand barrels of apples that have not capacity for more than seven. I have lost thousands of dollars for that reason, but the fruit was there and had to go some way, for we were afraid of frost at this end and our time was limited. In regard to the hope of putting on the English market our grapes, pears and plums, I would say at present I do not believe we can produce a grape that is going to meet with the requirements of the British public. They want a meaty grape, with less seed, and a grape that they can masticate. They bite their grapes and chew them; they masticate their food. They are not satisfied to swallow pits and pulp all in a lump. There are peculiar flavors about our grapes, so that it seems the taste has to be educated. We have grapes there that come from Lisbon and parts of France which meet the require-

ments of the consuming population there, and I don't think that we are doing right to expect to make a success of our exporting grapes until we can produce an article that they want. I have spent money in trying it. I was prejudiced in favor of our own grapes and wanted to see the trade developed. I didn't ask anyone or the Government to stand by me; I tried it in my own interests. I thought if we could only get them to use our grapes there was money in it; however, I didn't make a success of it. Pears are produced in France and some parts of Belgium and Germany equal to ours; they are close to the market, and except in years like this where the crop is a failure I hardly think that we can hope to open up a very large trade. In tomatoes the sources of supply are widening every year. You may think it is strange, but across from Liverpool, in Cheshire, they are producing as fine tomatoes possibly as we are producing in any part of Canada. I have seen them right there. I will not say that they will produce them every year as good. We do not produce as good tomatoes and peaches here every year. However, in the island of Jersey they are producing as fine tomatoes every year as can be grown under the sun, both in flavor and appearance, and they have been coming into England in large quantities and have sold heretofore as high as sixpence, eightpence and tenpence a pound readily. They are producing larger quantities because it pays them, and the price is receding every year. The tomatoes they are getting from Spain are not as good as those that we grow here, nor are they as good as those grown in France, but they are getting what they call an English seedling, which is a very bright red tomato, and the stem is green. I do not know the names of the different varieties of tomatoes, not being closely connected with the growth, but it is a smooth tomato and perfectly red, and in flavor equal to anything I have ever tasted. I do not want to throw a pail of cold water over any scheme we have for increasing our trade, but I do not think there is much use of spending money upon a business which is not likely to be lucrative. Of course I do not mean to say that you cannot produce grapes that will meet the demand there; I believe you will. I do not mean to say that all you intelligent fruit growers are going to sit down and say that you have accomplished what you have set out to do. I believe you will grow better fruit. I believe we will market and grade it in better shape, and I believe ultimately we may get better grapes there, and possibly will supply the market requirements there. In plums I don't know very much whether it would be possible to expect a large trade there. They are producing in Belgium and Germany large quantities of plums, and the peasantry, *i.e.*, the small fruit farmers, are going more into it year after year. The same in Kent and Essex and Worcester, in England. They are producing larger quantities year after year, and the demand, which is increasing by leaps and bounds there in fruit, is being largely supplied by home production. I think they can grow very good plums there. I have seen just as good plums there as I have seen anywhere, that is where they are grown in the south in Essex and Kent and down through Worcester; they grow them to perfection, I think, there.

The SECRETARY: If they are a very low price here do you not think it might pay to send them over?

Mr. SHUTTLEWORTH: Most of our fruits of that kind are bought for preserving. I will give you an instance of the quantity of fruit that is put up by some of the large firms. We think nothing of selling forty and fifty and sixty tons at a time to Crosse & Blackwell. I have seen us when we have had sixty and eighty tons of plums—and I have sent the whole lot in one day to one man, W. H. Hartley, just outside of Liverpool. He has a capacity of putting up 112 tons of jam a day. He draws his supplies largely from the continent, that is for certain varieties, and the rest he gets in England. They are producing to meet that demand, and we think nothing of taking an order from him of possibly ten or fifteen thousand cases of Salonne oranges. He will bring in a ship to take care of them, and you can understand that they are not behind the times so much as we imagine. They are meeting this demand largely by home production; they are increasing the home products. Germany and the other countries finally, I believe, will be driven out of the British market in a measure, owing to these home productions. They are going into the lowering of freights, that is, discriminating freights. We have, and so have the continental countries, advantages granted by the railway companies of Great

Britain which have not been granted to the home producers. It is an evil. They see this evil and they are going to remedy it ; that means that they are going to send their fruit from the Midland counties to those different points in the same district much cheaper than they have ever done before. Much land that has been under cultivation for grain will go under cultivation for small fruits. I don't think we will ever see them compete with us in apples. France will compete with us in pears, plums and strawberries and berries of all sorts—I think we can do very little with them. Until we can produce a better article in pears I don't think it will be wise for us to spend too much money in our experiments. We have tried it, and it has been a failure. Peaches are grown in France and come over there in very good condition, put up in small packages of about twenty-four—some twelve and some twenty-four—flat boxes. However, I think there is something that we could possibly do something with if we could get our fruit on to the steamer in time. Delaware may drive us out of that ; Delaware produces a good peach, and they are close to the seaboard, and can get them on the fast steamers.

The PRESIDENT : What about California shipments of fruit there ?

Mr. SHUTTLEWORTH : California fruit comes in after our English is pretty well over, and it meets only a limited demand. I don't believe California fruit will make a success there. I believe they are producing fruit over there which is far superior to California fruit. I believe we produce here a better pear than any California pear I have ever tasted. (Hear, hear.) I believe they are producing to-day in Lisbon a better grape than they produce in California. I have tasted grapes in California ; they may be better there than here ; but when we put them on the English market in comparison with the Lisbon grape I prefer the latter. Then again they are opening trade with the Cape. My people wanted me to go there two or three years since to look after the English grapes that grow there. They produce an excellent grape, very much in flavor similar to some hothouse grapes of Hamburg particularly. This is a wide subject. I believe I will have your sympathy in the matter of my position so far as defending myself as a shipper. (Hear, hear.) I do not think and never have thought that our interests as shippers and growers are antagonistic. I believe it is necessary that we should have both the confidence of the growers and shippers, and that they should have our confidence. I believe by working in harmony with each other we can make a success of certain lines. I think it is false policy to endeavor to build up a trade which is not likely to assume any proportions.

Mr. PARKER : What about the shipping qualities of the Spy ?

Mr. SHUTTLEWORTH : It is one of the best qualities. There is another apple that we do not give enough prominence to, and I think we ought, and that is the Greening. I think in time, when we get better shipping facilities, that we will get the Greening in better shape on the English market than ever before. The apples will not scald. Our Greenings from Canada keep very much better. You must remember that those quotations given by Mr. Woolverton are New York barrels, or pony barrels, as they are called. Our barrels are full barrels, and we try to get our American friends over there to use full barrels and have a uniformity of package. I think that ought to be striven for all through. It is not only better for the growers of apples, who know what they are selling, but for the buyer, who knows what he is buying. They are more easily tempted, I might say, to buy a package that they know something about than a package they don't know anything about. It seems a small thing, but when you come to sell it, it is a very important thing. It is a very difficult thing for me to explain to a man that a package is a square package, but it holds the same as a barrel.

The SECRETARY : Do you know what the legal capacity of a barrel is ?

Mr. SHUTTLEWORTH : I think it is three bushels.

The SECRETARY : I don't think it is so much ; it measures twenty-seven from chime to chime.

The SECRETARY : I want to introduce a little resolution which will, perhaps, shape the debate, or at least bring to a focus one point in the discussion. I am very glad to hear this admirable address from my friend, Mr. Shuttleworth. We had an idea, some of us, that there was a little friction of feeling between apple buyers and apple growers,

but I do not think that in anything we have heard this morning there is anything to cause friction at all. We find that to a great extent our interests are one. The point I wish to make is with regard to the amending of the Act that was passed by the Department of Agriculture last spring, which left out altogether the regulating of grades. Now Mr. Shuttleworth has told us this morning that he, as representing the buyer and shipper, would like to have these grades attended to and observed, and we as growers feel that it is a very important point also; so I would like to move:

“That this Association believe it to be desirable that an amendment be made to the Act for the Prevention of Fraud in the Sale of Fruit, providing for the definition of grade 1 and grade 2, in order to facilitate trade.”

Mr. McNEILL: I will second the motion, and would like to make a remark in relation to this address we have just listened to—one of the most valuable we have had during the sessions here, and well worth staying another day to listen to. (Hear, hear). I would also ask that we qualify any remarks that may have been made—remarks that must receive great weight when they are within our line of business, but should not have the same weight when we touch lines with which we are not perfectly familiar. I wish to make one correction. After studying the matter for years I state as my deliberate opinion that if the fruit trade in this country were regulated in varieties by the opinion of fruit experts, the trade would be nothing. Take for instance the Concord grape. When I was about setting out my orchard I had the opinion of a director of this Institute, and when I mentioned the Concord he said, “Yes a few Concords might go in!” Why, if it were not for the Concord grape I would not be in the grape trade. The grape industry in this country would shrink seventy-five per cent if the Concord grape were taken out of it, and yet the expert would hardly recommend me to plant so poor a variety of grape. The same with plums. What is the mainstay of the plum trade in this country? The Lombard, one of the poorest plums. So with apples. If we were confined to the Northern Spy the people of this country would have no orchards at all for commercial purposes. We may as well recognise that; and do not let it go out among the people who have not too much money to spend that it is the opinion of this Association that they should plant the Northern Spy. I grant it is a fine apple, and if I had my family in the position in which I wanted them I would give them the Northern Spy and nothing else if they wanted it; but it is almost impossible to grow Northern Spy apples in sufficient quantity to make it a successful commercial venture. There are two elements: The quality and the commercial backing. Let us be particular that these varieties that we recommend are those that can be grown in a commercial orchard for commercial purposes and for a long series.

Mr. PERRIT: The Legislature has regulated that question, I think, to the satisfaction of the fruit growers of this country as nearly as can be done. What a first-class barrel shall contain is specified in the Dominion Act and that was passed with a view of shipments to foreign countries. In the local Act it is required that the face of an apple package shall fairly represent its contents. I do think that to go and hedge about the fruit growers in this country along the lines of specifying distinctly what they should do is putting simply a block in their way and hindering the good work that we want to encourage in this country. (Hear, hear). I believe that as far as our shipments to the Old Country go we should try and work strictly under the Act for that purpose, and if possible raise the standard of quality and packing and condition of the Canadian apples in the British market to the highest point that it is possible for us to do. I question whether it will ever pay us to ship second-class stuff to the British market. I want to reply to Mr. Shuttleworth; he has taken the stand as one representing the views of apple buyers and handlers of fruit in the British market. With his great knowledge of the situation of affairs in the British market he has given us from their standpoint his views. We remember he is a Canadian like ourselves, engaged in the same business, but he has got imbued with the sentiments, I believe, that are strong in the foreign countries. Now we had a little comic song the other night telling about the poor fellow who “Couldn’t change it.” This is one of the things that I do believe we can change. What is the position in which we find the fruit growers in this country to-day? I find them not acquainted with the shipment of apples to the British market. They are not posted as

to what firms in Britain are reliable and good firms to ship to. They really don't know what they are going to do with their apple crop. It is too large to put in their cellars or to trust to their local market consumption; the time is short; the apple buyer comes around—I have been one—and he says, "I cannot give you more than so much for apples;" the farmer replies, "Well, you don't get out of this yard till you have them, because I don't want them to freeze or spoil on my hands," and he sells them at whatever price the buyer sees fit to give. Mr. Shuttleworth referred to the honesty of the commission men in the British market. Now, I have not a word to say about their honesty at all. I have shipped to them for years and years, and always come out very satisfactorily indeed—not, indeed, with a very large margin of profit, but without sinking any money. I believe they are just as honest as any other class of men, but I believe that their style of doing business is not in the interests of the fruit growers of this country. Now I will venture to say there is in this room many a man who has a brother, sister, father or mother who is living in England to-day and who has written about Canadian apples, and I will venture to say that you cannot show me one that has bought a good barrel of Canadian apples to put in his cellar or his house for use at very much less than six or seven dollars a barrel. I have had it from a dozen of them. Now, our apples are sold there at about twelve shillings on the average; that would represent in round numbers three dollars a barrel. Now, how in the world does the consumer pay so much and the producer get so little? The transportation company gets a dollar and a little more; I hope the buyer gets a little of it, he deserves it even if he is something in the road, as we call him. But the other part I don't know where it goes, unless to the fellow who rolls the barrel on the waggon, and another part for drawing it, and another for rolling it off again, and another for taking the empty barrel away and burning it and clearing up the rubbish. In the best interests of the grower I think we ought to get out of that rut if we can. I claim that the closer we come in touch with the consumer of any country the better off we are. The nearer our market is to our door the better it is for us, and when we get our growers to take hold of this matter and pack their apples, I hope by that time we will be able to ask the Government to fill the gap that is now vacant by an inspector and ask him to inspect at the point of shipment and brand them just as they are—not that we are going to make it compulsory for our growers to have their apples inspected, but to give those who want their apples inspected a brand that will introduce them into the British market. I hope our Government will do something on the line that they are going to do with the dead meat trade, that is, that they will have emporiums throughout the land where Canadian meat will be represented and sold as Canadian meat. And when the product gets directly in that way to the consumer we will get better results than we get to-day. In regard to the Englishman not liking our grapes I think Mr. Shuttleworth needs an answer. Grapes are a product that we are growing immense quantities of, and we are prepared to put them on any market at a low price and yet one that will be satisfactory to the producer in this country. When Englishmen come to this country—and I have met many of them—they do enjoy our grapes, and I venture to say that if there is a Canadian that can put away more of them than an Englishman does when he comes here, he is a pretty good specimen. (Laughter and applause). I say we will put them in the British market so cheap that the poor man and his family can indulge in that luxury which to-day he dare not touch. Take another point—our Canadian tomato—I don't believe there is a country in the world that can produce a tomato equal to that grown in the Province of Ontario.

Mr. BOULTER: That is so.

Mr. PETTIT: What is the price of those in the British market—two, four, six and seven pence a pound. What do they run in Canada? One-half cent a pound.

Mr. MCNEILL: One-quarter cent a pound.

Mr. PETTIT: Give them a half cent.

Mr. MCNEILL: I will contract to sell anyone here for twenty cents a bushel, I don't care how many carloads you take.

Mr. PETTIT: Half a cent a pound for Canadian tomatoes in our market is about the average price they are bringing to-day, and I have quoted you the price in the British market

and I am satisfied we can land them in London, Liverpool or Glasgow at a cent a pound or a cent and a quarter at the very most, and if we can put them there we want to put them where the poor man can eat them, and we will make him and his family healthy and appreciate the luxuries that this fair land can produce. (Hear, hear.) That is the way we are going to claim that market. That is the way we are going to educate the Englishmen. We have been educating him along the line of that apple, the Ben Davis, and I am sorry to say our Secretary has been trying to educate him along another line with that Cranberry Pippin. (Laughter.) We are going to send him something better than that. A little while ago he said, "I don't want anything but a red apple." I often wondered why he wanted it red, but a fellow told me when he came from the Old Country, "that they can polish them up so nice on the street corners that they can sell a great many by that process." (Laughter.) They did nibble away at the Ben Davis a while. They did not like the Rhode Island Greening because it was of a dark green color. To-day the Englishman likes to get a Canadian Greening just as well as we do, and he finds it one of the most valuable for cooking, for dessert, or for any other use that he desires to put it to, and we are going to go on educating him along that line. Mr. Shuttleworth refers to certain other countries being able to raise products that will crowd us out. There is not one of those countries in ten that produces at the season we do, therefore we are going to come in at the opening and fill them up to the handle. (Laughter.) We have in this country the people, the energy, the "pluck and plod," as the Hon. Mr. Dryden said yesterday. We have gone into that market with our cheese and have stayed there, and to-day we are claiming the cheese market. (Hear, hear.) We have gone into that market with butter, and I believe the day is coming when the pluck of Canadian people will drive the Danish butter to one side and claim the market for us. I believe the same in regard to our Canadian apples and fruits, when we put ourselves in a position to force our way into those large centres of trade in the old country—not only in England but every country where we can drive the wedge in—for we know that when we do drive it in we are going to give them something that is good and wholesome and to their best interests. I say that is what we are going to do—to wedge our way in and educate the people and do as we are not doing to-day, send thousands and thousands of shipments to those markets in the near future. How are we going to prolong this market? I believe we are going to occupy that market from October almost to the following October by a system of cold storage, where we will send them forward in their season such apples as are ripe and in perfect condition for use, and place them on that market and sell them. We will begin October and send varieties in succession, until the Canadian Spy goes into the market, and with them we will feed them right up to the fresh apples again. Speaking of the Canadian Spy I say that if that apple is grown perfectly and in good condition we have a great market for it, not only in Great Britain but to the south of us to feed our neighbors when their apples are gone. (Hear, hear.) They live in a warmer climate than ours; their apples will not keep like ours; the farther north the better the quality and the longer the keeper; and instead of giving them our money for bananas or other fruits that our people like to feed on, we are going to give them our apples to the extent of millions of barrels.

Mr. J. W. SMITH, of Winona: I would like to ask Mr. Shuttleworth if he thinks the Kiefer pear will ever take in the English market? That is an important question because we can grow enormous quantities of that variety.

Mr. SHUTTLEWORTH: I don't know enough of the Kiefer pear in its keeping qualities as a shipper to satisfactorily answer that question. I have not seen it tried sufficiently. There are a great many fruits that we grow here that are all right for the home market that do not stand shipping. May I say in answer to Mr. Pettit that Canadian fruit comes into the English market at the same time that we get fruits from other countries; our Canadian pears and apples come in the same time as the French and German pears and apples; and when the bulk of our apples are consumed we are getting fresh apples from Tasmania and then from Lisbon and so on north, so that we have apples the year round.

Mr. CASTON: What time does the Tasmanian apple reach England?

Mr. SHUTTLEWORTH: In April.

Mr. SCHELL (Woodstock): I shipped a good many Kings, and they did not bring us very much above the Spys, simply because the quantity of them was larger than in other years. In regard to the question of grading No. 1 and No. 2, I tried that and I do not think you could get a more difficult thing to handle than that. You send a gang of men into the orchard and tell them what you think are No. 1, and perhaps in that same orchard two trees are standing right side by side of the same kind and there is such a difference that some people would not believe they were the same kind, and yet they are perfect, there is nothing wrong with them. Now, how are you going to grade them? They are both perfect, and perhaps there is a little difference in the color or there may be a slight difference in the size. If you send out over a dozen gangs of men and tell them to grade them No. 1 and No. 2, there is hardly a gang that will grade those apples the same as another gang. What one gang will say are No. 1 apples the other gang will say are No. 2. If you ship No. 2 you will lose money every time.

The SECRETARY: According to your own statement you do not know what is meant by grades 1 and 2.

Mr. CASTON: Is there not a class of apples too good for culls and not fit to go into first-class barrels?

Mr. SCHELL: That is one of the difficulties of grading apples. That is the trouble of getting farmers to pack their apples. They give themselves the benefit of the doubt, and in they go. (Laughter.)

Mr. RICE: As to packing your own apples in your own orchard, I am not only a Michigan man, but I came from the great apple-growing region of Wayne county, New York, where we had to pack apples by the million barrels; and had we waited for the buyers to come into our orchard and pack our apples we would have been at least three or four years behind. (Laughter.) Now there are things that work themselves out if you just allow them to do so. In selling our apples the buyers knew that we were producers, and the buyers were always there in competition. There was not simply the one buyer, as Mr. Pettit said, to whom the farmer would sell at any price, but before one buyer got out of sight the other was in sight, and the first one that came was sure to come again, and so we had a chance to pick our buyers. We picked our own apples in every case, but when they were sent into the market the heads were taken off and if they found one barrel that was suspicious, very quickly the whole lot was considered as under suspicion, and very likely that man was required to put his barrels in one corner and go to work and re-sort them. He knew he would get caught the next time he came in with his load, so he brought in his apples in right shape, and in all our apples I never yet heard of an instance where a buyer had purchased apples and paid for them that he ever went back on the seller for damages. He examined the article when he came into the storehouse and there accepted it and paid for it, and the man went home. They knew the packers and the character of the packing from experience, and governed themselves accordingly as to watching them. In this way this matter often works itself out and does not require any paternalism by the Government. In regard to the pony barrel, our Legislature passed a law that one hundred quarts should represent a barrel, and that made the pony barrel, but most producers preferred to put in a peck more and have common barrels rather than have their apples go out in pony barrels. That gives us trouble all the time. The pony barrel is the snare to buyers in foreign markets everywhere, and we are sorry for it. That is working itself out, too. I do not think it needs any legislative action to prevent that. If you can grow the Northern Spy you have the world as your market. (Hear, hear.) At our last Horticultural Society meeting a great many noted men were present, and the question was asked, what will we advise our people to plant? Some said Northern Spy. President Morrill, of Benton Harbor, said: "Will you put that curse upon a young and inexperienced man who asks you innocently for advice what to do? Will you tell him to plant a thing that you know he will never take one dollar out of above his expenses?" (Hear, hear.) Professor Bailey said: "I would not recommend the planting of it, not because of the quality of the apple but because your expenses will count up far beyond what you will ever take out of it." That is the experience we have had in our country with it. Now, if you can make money out

of that apple, plant your whole country with Northern Spys and you cannot make any mistake. We cannot make any money out of it. I have no words in favor of the Ben Davis. It comes right into the market when it is met by your Fameuse, and if you can grow the Mackintosh Red as I have seen the samples here to-day—we cannot grow it without the scab—you meet the Ben Davis with the Fameuse and the Mackintosh Red, and we stand no sort of a show. You grow Ben Davis not to sell against the Fameuse and the Mackintosh Red; you grow it for next year's market, and the idea of putting it on the market when better apples are being sold is perfectly outrageous. (Hear, hear.) Don't send your Ben Davis off to be examined and sold at auction when good apples are being sold. Let people grow Ben Davis, selling them if they have a mind to; they won't hurt you as long as you can put in your Greenings. While Ben Davis are being sold at \$1.75 men are trying to find some Canadian Greenings and are willing to pay \$3.75 a barrel for them.

Mr. SHUTTLEWORTH: I think the best Ben Davis have come from Southern Illinois this year.

Mr. PETTIT: Nebraska will knock them out.

Mr. MCNEILL: A very large dealer in Detroit said they got them from Missouri.

Mr. RICE: Mr. Augustine, in Illinois, has planted 40,000 Ben Davis apple trees and calculates to supply the world. They calculate they will build a special line of railway to the seaboard and have a special line of steamers to carry them into the foreign market. (Laughter.)

Mr. RICE: If you were planting trees for your children you would certainly recommend planting the Spy?

Mr. RICE: No, sir, I would not, because I want my children to have apples. (Laughter.)

Mr. BOULTER: If you were living in Canada would you advise planting Northern Spys?

Mr. RICE: Taking the Canadian evidence for it that it is bearing well.

Mr. BOULTER: Did I understand you to say that your locality has given up growing them?

Mr. RICE: No; I say they do not bear well there, and there has never been a dollar taken out over and above expenses. A man went down to Canada and bought a carload of Golden Russets, Northern Spys, Tolman Sweets and several other varieties—Baldwins, I think, a few; he sold them right out at \$3 a barrel without any difficulty whatever at the same time that the Ben Davis was being sold at \$1.75. As to the quality of those Tolman Sweets, we never saw anything grown in our vicinity that equalled them at all. I looked over the Greenings and there was not a worm-hole anywhere on them. The Greenings in western New York even have worm-holes. Now there are more varieties than simply the Northern Spy that will bring you good prices if you grow them. (Hear, hear.) It was stated at our Horticultural Society meeting that the Baldwin is no longer worth planting. The time was that it was said that if a man had a thousand trees to plant he should plant 999 Baldwins and then go and get a Baldwin to finish up with; and those same orchards have had to be cut down because they are not bearing, and the Baldwin is going out of bearing throughout our whole country. If you can grow them you can send them the world over.

Mr. MCNEILL. It grows here well yet.

Mr. RICE: If the Baldwin grows well with you, go ahead with it; but, if you have an apple that does not bear, what is the use of planting out an orchard that has no profit in it? So we are not recommending the Baldwin in Michigan any more. The trees are so affected by scab that we have to drop it out.

Mr. CASTON: In our sections we have a large class of beautiful fall apples. They come to great excellence and perfection of size and beauty, and many are of very good quality. Now, if we could get a market for these apples, there is more money in them

than in any kind we can grow, because they produce fruit almost as soon as they are put out. Take the Wealthy, for instance, there is more money in that apple than in our winter apples. We have a large number of Wealthys which are practically wasted because we cannot get them to the market. We owe a debt of gratitude to those gentlemen of the Niagara Peninsula who have contributed the fruit to this trial shipment. From what I can hear they are likely to lose that fruit entirely. They have made that sacrifice, and it was for the public interest, and I say it is nothing but right that we should recognize it as fruit growers. They are prepared to do further in that line, but I hope they will not be subjected to any loss in their worthy and laudable efforts to secure a market for our fruits in the Old Country or anywhere else in the world.

Mr. PETTIT: We will lose it again if necessary, but we intend to break the ice. (Hear, hear.)

The SECRETARY: It was simply to define what grade 1 and grade 2 means that I made that resolution. I do not wish to press it upon anybody unless they choose to use that mark. Even for the Toronto market, if I agree to buy a barrel of No. 1 apples and have a dispute about the quality, I should like to have some way of appealing to know what grade 1 means, and I think it should be defined in the Provincial Act. However, the time is now so far gone that we cannot debate the question longer, and, with the permission of Mr. McNeill, we will lay it over and take it up at some future time.

Mr. G. R. PATTULLO read the report of the Committee on Resolutions and moved its adoption. The motion was seconded by Mr. Smith and carried amid applause.

REPORT OF THE RESOLUTION COMMITTEE.

Your committee beg to report as follows:

That the thanks of this Association be cordially tendered to the Woodstock Horticultural Society for the ample and satisfactory arrangements made by them for the holding of this Convention, which has proved to be one of the most interesting and successful in the history of the Association.

To the mayor and corporation for the cordial welcome extended to us and the opportunities offered to see the manufacturing industries, the educational institutions, and the many comfortable homes of this beautiful and prosperous town.

To the Principal and faculty of Woodstock College, for the pleasure of a visit to that Institution, and for the generous hospitality enjoyed there.

To the ladies and gentlemen who have so kindly contributed their musical efforts at the public meetings on Wednesday and Thursday evenings.

To Messrs. L. B. Rice and L. D. Watkins, our visiting comrades in the great work of horticultural development, who have been with us as representatives from the great State of Michigan, and Mr. T. Greiner.

To Professors Saunders and Craig, from the Ottawa Central Farm, and Dr. Mills, from the Ontario Farm at Guelph, all of whom have greatly contributed to the interest and profit of this Convention.

To the Hon. John Dryden, Minister of Agriculture for Ontario, for his presence, practical sympathy, and valuable addresses at the Convention.

To the Woodstock press, the Toronto press, and the Associated Press for the specially full and satisfactory reports that have been given of the proceedings of the Convention, and the interest that they have thus shown in the work of this Association.

All of which is respectfully submitted.

W. M. ORR,
A. M. SMITH,
GEO. R. PATTULLO, } Committee.

Mr. PARKER thanked the Association for the kind manner in which they had acknowledged the efforts of the local society, and expressed his disappointment that a larger number of people did not turn out to the evening meeting.

Mr. WATKINS thanked the Association for the gentlemanly manner in which the delegates had been treated, and hoped that his society would always be in close touch with this one, and that there would be reciprocity all the way round.

The meeting closed at twelve o'clock noon.

APPENDIX.

REPORTS FROM AFFILIATED HORTICULTURAL SOCIETIES.

BURLINGTON.

At the annual meeting of the Society held December 17th, 1895, the following officers were selected for the year 1896 :

President.—Geo. E. FISHER, Freeman.

Vice-President.—J. S. FREEMAN, Freeman.

Secretary-Treasurer.—A. W. PEART, Freeman.

Assistant-Secretary.—Geo. N. PEER, Freeman.

Directors.—Apples, EDWIN PEART; Grapes, D. JARDINE; Small Fruits, JOSEPH GARDINER; Pears, W. V. HOPKINS; Peaches, JOHN IRELAND; Plums, W. F. W. FISHER; Cherries, T. FOSTER; Vegetables, J. W. BRIDGEMAN; Shipping, JOSEPH LINDLEY, J. S. FREEMAN and O. T. SPRINGER.

Auditors.—FRED PARSONS and WILLIAM EMERSON.

Executive Committee.—Dr. HUSBAND, ALEX. RIACH and T. GLOVER.

Reports on the various departments of fruits were made by the following gentlemen :

Geo. E. Fisher on "Apples;" A. W. Peart, "Grapes;" J. W. Bridgeman and Joseph Gardiner, "Small Fruits;" W. V. Hopkins, "Pears;" Alex. Riach, "Peaches;" W. F. W. Fisher, "Plums;" J. S. Freeman, "Cherries and Shipping."

The Secretary-Treasurer presented his annual report which showed an increase of membership for the year, and a substantial balance on hand.

The President, Geo. E. Fisher, in his annual address referred to the steady growth of the Association, and the necessity for each member to work zealously for its good to the mutual profit of all. We should be ready at all times to modify our plans according to the changing conditions, adopt business-like methods, and be on the alert for the best markets. The fruit grower of to-day should be educated and understand the principles of botany, chemistry and pathology as applied to the production of fruits. He endorsed the scheme of local experimental fruit stations, as they would save both time and money. While fruit growing is one of the great industries of this province, we must pay strict attention to the quality of our fruit as outside competition is very keen. In closing an able address he said that a united effort should be made to try to retain all the old members of the Association, and secure as many new ones as possible for 1896.

The past year of our Society has been a successful one, both in the increase of membership and in the interest taken in our public meetings. We have held four regular meetings as well as the annual. At each of these, addresses or papers, on some subject relating to fruit were given by experienced fruit growers. The acreage of fruits, especially the smaller ones, has been very much increased, a good deal of attention being paid to currants, blackberries and raspberries. In common with many other sections of Ontario, the May frost did a good deal of damage, still, there was sufficient fruit left at remunerative prices, to give growers a fairly prosperous year. Apples were the best crops known for years, and the quality was prime, even the Snow Apple and Holland Pippin being spotless.

As usual, many members took advantage of the annual drive, and spent a pleasant and profitable day among the orchards of the Dundas and Waterdown districts. We also exhibited a collection of fruit at the Industrial Fair, Toronto, to which was awarded first prize.

The following gentleman contributed papers or addresses during the year :—Messrs. W. King on "Small Fruits;" A. W. Peart, "Fertilization of Fruit Blossoms;" J. W. Bridgeman, "Bees in Relation to Fruit Growing," and Geo. N. Peer on "Raspberry Culture."

BRAMPTON.

OFFICERS FOR 1896.

President.—DR. D. HEGGIE.

1st Vice-President.—HENRY DOLE.

2nd Vice-President.—DR. C. T. MORSE.

Secretary.—A. MORTON.

Directors.—C. M. FRENCH, H. ROBERTS, MISS J. IRVIN, MRS. A. W. WOODS, MRS. MARY GRAHAM, A. G. BUCKHAM, E. FALLIS, A. McKECHNIE, A. MORTON.

CHATHAM.

OFFICERS FOR 1896.

President.—His Honor JUDGE BELL.

Vice-President.—J. A. WALKER, Esq.

2nd Vice-President.—MRS. D. S. PATERSON.

Directors.—G. K. ATKINSON, W. E. RISPIN, T. M. FRENCH, MRS. ELLIOTT and MISS EDITH COLTART.

Auditors.—W. F. MALCOLMSON and W. E. McKEOUGH.

At the meeting of the Directors subsequently held, W. E. RISPIN was appointed *Secretary-Treasurer* of the Society.

GRIMSBY.

OFFICERS FOR 1896 :

President.—JOHN H. GROUT.

Vice-President.—MRS. ADOLPHUS PETTIT.

2nd Vice-President.—L. WOOLVERTON.

Secy.-Treasurer.—C. W. VAN DUZER.

Directors.—MESDAMES E. J. PALMER, D. V. LUCAS, E. J. WOOLVERTON, AND J. G. NELLES, AND MESSRS. C. W. VAN DUZER, READ, ADOLPHUS PETTIT, A. TERRY-BERRY.

THE GLADIOLUS.

BY MRS. E. J. PALMER, GRIMSBY.

I had but little idea of the value of Gladiolus when I began to prepare this paper, and I think we have been most fortunate in choosing it for our initial effort. It belongs to the order Iridaceæ. The roots are bulbous; the leaves linear or sword-shaped, from which it derives its name Gladiolus (Latin for a little sword). The Cape of Good Hope produces the greater number of known species. A few, however, are natives of other

countries, and two or three are found in Central Europe; none are British. The original species have since been superseded by the very numerous and beautiful hybrids that are in cultivation, though many of the originals are retained, and are useful in the mixed border. The Hottentots eat the bulbs of some species which contain a considerable quantity of starch.

The bulbs should be planted in a rich, light, mellow soil, about 20th of May, if the ground is warm, and, for a succession of bloom, every two weeks till the 1st of July. A sunny situation, with ground well spaded and thoroughly pulverized, is the most suitable. If the soil is heavy, plant from one to two inches deep; if light, three to six inches. If bulbs are planted deep they attain a greater size, and are better able to stand a season of drought. They are moisture-loving plants, and, for that reason, they succeed well in England. I think the finest flowers and largest spikes are obtained by late planting, as they come into bloom about the 1st of October. If planted early, they should have a light mulching of newly-cut grass. It is one of the richest of our summer-flowering bulbs, and so refined and delicate in quality of color that it is never anything other than satisfactory. If you care for a soft, pale shade, you have it; if you prefer the brilliant scarlet, crimson or violet, they are before you in every shade. No garden should be without them, or their gorgeous display of bloom. As cut flowers, they are most satisfactory; and if cut when the first four flowers are in bloom, and placed in water, they will open bud after bud till the whole spike is in bloom. The bulbs should be taken from the ground before danger of frost, put in paper bags and kept in a dry cool place, free from frost.

I am sure we will derive a great deal of pleasure from the cultivation of our Gladioli. Horace Smith says: "The purest happiness our hearts can enjoy is that which is wafted to us from the hearts we have made happy, even as the flowers which we ourselves have planted ever seem to breathe around us a sweeter and more acceptable fragrance."

HAGERSVILLE.

OFFICERS FOR 1896.

President.—WM. HARRISON.

First Vice-President.—ALBERT SNELL.

Second Vice-President.—THOS. HARRIS.

Secretary-Treasurer.—S. W. HOWARD.

Directors.—J. H. HAGER, GEORGE HALL, S. B. HARRISON, J. W. HUSBAND, P. R. HOWARD, CAPT. STEWART, HENRY BYERS, GEORGE E. SMITH, THOS. BETHWERICK.

Auditors.—S. B. HARRISON AND J. W. HUSBAND.

LEAMINGTON.

OFFICERS FOR 1896:

President.—W. W. HILBORN.

First Vice-President.—WM. SMITH.

Second Vice-President.—JOHN MITCHELL.

Directors.—M. T. BRUNER, C. CURTIS, F. W. DEADMAN, D. SINASAC, E. HAWKES, E. E. ADAMS, GEO. MILLS, J. C. ROSS, J. L. HILBORN.

Secretary-Treasurer.—J. E. JOHNSON.

LINDSAY.

OFFICERS FOR 1896.

President.—J. H. KNIGHT.*Vice-President.*—ALEX. CATHRO.*2nd Vice-President.*—T. BRYANT.*Secretary-Treasurer.*—F. J. FRAMPTON.*Directors.*—RICHARD HELSON, COL. JAMES DEACON, ROBERT SPEIR, JOS. BRICKABY, ROBT. CHAMBERS, W. H. STEVENS, W. KING, F. J. FRAMPTON, W. PEDLAR.

NAPANEE.

OFFICERS FOR 1896 :

President.—MRS. W. H. WILKISON.*Vice-President.*—MR. T. M. HENRY.*Secy.-Treasurer.*—J. E. HERRING.*Directors.*—MRS. ROBERT MILL, MRS. R. G. WRIGHT, MRS. F. S. RICHARDSON, MRS. ARCHIBALD McNEILL, JAMES HARMER, JAMES BOWERMAN, W. S. HERRINGTON, GEORGE LLOYD, G. C. T. WARD.

NIAGARA FALLS.

OFFICERS FOR 1896 :

President.—W. P. LYON.*Vice-President.*—RODERICK CAMERON.*Second Vice-President.*—THOS. BERRYMAN.*Secretary.*—E. MORDEN.*Treasurer.*—J. G. CADHAM.*Directors.*—MRS. LAND, MRS. LOWELL, MISS L. McNALLY, REV. CANON BULL, H. G. A. COOK, GEO. A. PYPER, J. G. CADHAM, E. MORDEN, GEO. LANE.*Auditors.*—GEO. C. BIGGAR, WALTER KER.

Number of members, 1895, 100 ; members for 1896 already enrolled, 60. Will give to each member two lilies and three cannas, with perhaps some other bulbs or seeds. Each member will receive two monthly journals. A September exhibition will doubtless be held. Smaller informal shows are also spoken of. There has been an excellent staff of officers from the start. Twenty-three directors' meetings last year, and all of them harmonious. This is not often the case where prizes are given, and might not continue if we adopt that system. We find that our lady directors are very useful.

PARIS.

At the annual meeting of the Paris Horticultural Society the Treasurer's report was read, which showed the Society to be in a flourishing condition. He reported a balance on hand of \$119.55. This amount it is proposed to expend on the purchase of bulbs, plants, etc., for the members as they may deem best. It is requested that suggestions as

to what may be the best shall be left with the Secretary-Treasurer by members when renewing their subscription for the next year. We understand that the Society purposes holding a number of meetings during the year; also, that a flower show will be held in the fall, which will be fully appreciated by all lovers of floral and horticulture. The following officers were elected for the ensuing year:

President.—F. WILEY.

Vice-President.—D. M. LEE.

Secy.-Treasurer.—C. H. ROBERTS.

Directors.—J. CARNIE, SEN., L. GERNDT, J. SKEA, A. W. ROUSELL, MRS. H. BICKLE AND MRS. A. MENNIE.

PORT COLBORNE.

OFFICERS FOR 1896.

President.—E. O. BOYLE.

1st Vice-President.—L. G. CARTER.

2nd “ W. W. KNISLEY.

Secretary.—D. W. MCKAY.

Treasurer.—A. E. AUGUSTINE.

Directors.—W. HOPKINS, MRS. A. K. SCHOOLFIELD, MRS. D. W. CARTER, MRS. J. STEELE, J. H. SMITH, F. HOSCKKE, REV. J. M. SMITH, D. W. MCKAY, A. E. AUGUSTINE.

PORT HOPE.

OFFICERS FOR 1896.

President.—H. H. BURNHAM.

Vice-President.—WM. CRAIG.

Secretary-Treasurer.—A. W. PRINGLE.

Directors.—W. W. RENWICK, JOHN SMART, P. BROWN, S. WICKET, S. G. WATSON, T. J. TILLEY.

The first annual meeting of the Port Hope Horticultural Society was held in the Opera House, Port Hope, March 9th, 1896.

Owing to the absence of the President, Mr. H. H. Burnham, the chair was taken by Mr. William Craig.

DOCTOR PURSLOW, the first speaker of the evening, then read an interesting paper on “The Pillaging of our Gardens.” The doctor said that if the Horticultural Society was to thrive, it must put this down. There were two kinds of depredations; the robbing of flowers, which was done mostly by young girls, and the robbing of fruit, by boys and young men. The remedies proposed were: Bringing it before the pupils in the schools; inserting articles against it in the local papers, and distributing leaflets against it. In case this did not succeed, the doctor thought the horticulturists should resort to the law. As this is seldom done individually, he suggested the horticulturists forming a committee called the “Garden Protective Association,” to prosecute all offenders, and thus protect the members of the Society. If any difficulty was found in discovering the culprits, to engage the services of a professional detective, the expense to be borne by the Society. The doctor thought that if this were done, and a few examples made, the members would have no trouble in this direction.

INSECT LIFE.

Dr. BETHUNE then gave an address, of which the following is an abstract :

Mr. CHAIRMAN LADIES AND GENTLEMEN,—I have been very much pleased that a horticultural society has again been formed in this town. When it was proposed to me to take part in this, the first annual meeting of the Port Hope Horticultural Society, I was at a loss to know what to bring before you, unless it were my favorite subject, that of insects.

Every person knows that there is a great variety of insects. Probably you are not aware that the insects more than equal all the animals that inhabit the earth both in number and bulk. We must not, of course, include the fishes of the ocean, as we do not know their numbers, but confine ourselves to the inhabitants of the earth. The insects, then, more than equal all the other animals of creation. Just one instance of their numbers: A writer says that he observed a flight of locusts crossing the Red Sea and covering two thousand square miles. He calculated that the locusts would weigh about one-sixteenth of an ounce each, and computed that they would weigh altogether forty-thousand millions of tons. It seems incredible.

What I thought of doing to-night was not so much to entertain as to instruct. This is only the first meeting of the Port Hope Horticultural Society, and I may perhaps be called upon to give you further information at some future time so will confine myself to-night to some remarks upon insects.

The first question that rises in the mind is, what is an insect? I suppose everyone thinks they know what constitutes an insect. Some will tell you that a spider is an insect, but it is not. They are first cousins of insects, but they do not belong to that class themselves, though they are very near relatives. Take thousand legged worms; they are closely allied to insects, but they are not insects themselves.

Well, an answer to the question as to what constitutes an insect, is, of course, its structure. We find that these creatures are all built on a certain plan; there is a plan upon which the great Creator has chosen to work. In their formation we find the body divided into three distinct parts. The first division is the head, the second is the thorax, and the third the abdomen. The head contains the mouth; the thorax, the legs and wings, and the abdomen the breathing apparatus and other internal organs.

What may surprise some is that the breathing apparatus is contained in the abdomen, the third part of the body. Some people try to kill an insect by closing its mouth, but it does not affect it at all. They dip its head into oil, but, beyond inconveniencing it a little, it does it no harm. The reason is plain to be seen—they do not subject the right part of the insect to the oil.

You will notice on these diagrams (pointing to some on the wall) that there appear feelers on most of them, especially on the butterfly. These are called antennæ, and they are organs of sensation of the insect. You will notice that in an insect there will always be found a pair of antennæ.

In their perfect state insects always have at least one pair, but mostly two pairs of wings. Those that have only one pair, have rudiments of a second pair. The flies are the only ones that are destitute of two pairs.

Then the next distinction is that they all have six legs in the perfect state—I am speaking of the winged state. In this stage all insects have six legs—never more or less—except in the case of some butterflies, which have only four. If you find one with six legs, then you know that it is an insect.

I just said that I was referring to the perfect state, but there are others as well. You will see by these diagrams that there are different stages. All insects go through four stages to a greater or less extent.

The egg is the first state. Insects begin life, like all living creatures, as an egg. The egg is laid and from the egg is produced a little caterpillar, grub or maggot. The caterpillar grows very rapidly and goes on eating during its existence. It afterwards

assumes a dormant state ; some burrow in the ground while others wrap themselves up in a silken cocoon.

Grasshoppers, etc., do not go through such complete stages. The larva of a grasshopper is very much like the perfect insect when born, except that it has no wings. This, then, is an exception but, as a general rule, there are four stages of existence

In the caterpillar, this rule about the six legs does not hold. There are, however, a series of legs, called pro-legs, which help the insects to move along. The majority of the insects are all supplied with these appendages which answer the purpose of legs. There are some others, though, which do not. Taking it as a whole, then, this is the usual form in which these creatures are constructed ; but this is a very large subject and I will not have time to dwell on this any longer.

The next point is :

THE MODE IN WHICH INSECTS FEED.

There are two kinds of insects—those that feed by biting with their jaws and those that feed by suction. You can see that if you want to kill a biting insect you would have to adopt a different plan than you would to kill a sucking insect. Horticulturists have to understand these two systems and to base their actions accordingly.

I was intending to tell you something about the different families, but I think I will change my line and say a few words about dealing with noxious insects. Everyone knows what plagues they are. Personally I am indebted to them.

A number of years ago a number of us formed an entomological society, and had great difficulty in getting along, having to depend entirely upon ourselves. We started a magazine. By correspondence we found that there was a scourge affecting the potato in the Western States. I had occasion to visit Chicago and found it to be true. We immediately set to work to learn all we could about it. I wrote an article in the *Toronto Globe* and one in the *Canada Farmer*, calling upon the Government to make some effort to keep this troublesome pest out of Canada. Our idea was by not growing any potatoes for some distance from the border, we might check their progress. The long and short of it was that we started to work and formed a committee for experimenting. It was found that Paris green was the one effective remedy. After this the Government of Ontario gave us an annual grant, which they have continued for some years past, and gradually increased to a thousand dollars a year.

Speaking of Paris green reminds me that it has now become the greatest means of destroying insects that has ever been discovered. It is generally delivered by means of pumps which send a fine spray through the foliage.

Another insect that gives a great deal of trouble is the codling worm, which burrows into the heart of the apple. This codling worm has been a very difficult worm to get rid of. The moth lays its egg in the eye of the future apple. It generally destroys the apple and it falls to the ground.

With regard to the use of Paris green by spraying the trees just when the apple is formed. The Paris green is spread all over the tree by means of the spray-pump. When the caterpillar starts out of the egg to burrow into the apple, the first thing it does is to eat some of the Paris green and is consequently destroyed. The plum weevil will also be kept in check by spraying with Paris green. So far we have been dealing with biting insects.

We will now turn to those that live by sucking. It would be no use spraying anything on the foliage. You have to apply it to their bodies. The remedy is coal oil, but if applied to the foliage direct, the plants would be killed. By experiments it was found that if this coal oil was mixed with water it would destroy the insects and yet not damage the foliage. However, water is not the best thing to mix it with. If you take some soap and water and make strong soap suds, it will make a better mixture than water alone ; it will form an emulsion and you can then keep it for any length of time. Use a

spray pump in the usual manner and these insects can be destroyed in the same way. Those insects that trouble house plants can be destroyed also with the emulsion.

Now in regard to

SPRAYING TREES.

I know by personal experience that it is too much trouble. We either have not the time to spare, or we are too lazy, and let our trees be ravaged by insects year after year. I want to make a suggestion in regard to this. It is that our gardeners should do this work for us. Those that cultivate flowers and fruit, would be only too glad, I am sure, to pay a man if he would come around and spray our trees for us. I hope the gardeners of our town will take this matter up and act upon it. It would be a great blessing to those of us who are either too busy, or too lazy, to do it ourselves. However, if you do not come under this classification and do it yourself, be sure and put on an old suit of clothes.

I will now just refer to one or two other matters. There has been a very remarkable case of interest to ourselves in California. You all have heard of what a wonderful country California is for fruits. California fruit growers have been suffering from a scale insect that invaded the State a few years ago. In their trouble they sent for assistance to the department at Washington, and Professor Riley proceeded to investigate. (I have no hesitation in saying that Professor Riley has done more in making the habits of insects known than any other person in North America or even the world.) He knew it must have come from some other part of the world. He at once took up the study of this scale insect. He found that the Californians had been importing fruit trees from New Zealand and Australia, and came to the conclusion that the insect must have been imported with the trees. However, in Australia and New Zealand the scale was scarce, and the inference was that there must be something that kept it in check. He asked the authorities at Washington to send over a couple of men to Australia and New Zealand to investigate and find what was keeping it in check. The Department would not grant his request. However, he succeeded in another way. There was to be an international exhibition at Melbourne and the American Government were sending over representatives. He succeeded in getting two of his own men appointed, and when they got there I can assure you they did not spend much time at the exhibition but in searching for this insect. They found that a little beetle called a "lady bird" was keeping them in check. They sent some of these lady birds over to Mr. Riley by mail and he had them placed on some trees where the scale insects were at work, with the result that they soon cleared the trees of them. More were then sent from Australia. Now they are not troubled with the scale insect at all. This, I consider was a great triumph for entomology. But some things that are imported do harm instead of good, like the English sparrow for instance.

The same thing is now being done in Western Virginia. The forests were being invaded by some noxious insects. So they imported some insects they thought would destroy them from Germany. In a large forest you cannot watch the results as closely as in an orchard, but I believe the experiment there also will be successful. I only mention this as an example of what has been done by entomology.

Before I sit down, I want to speak about another matter. It is that every person should have a hobby of some kind. I have derived a great deal of pleasure from the study of entomology. I would like particularly to impress upon you the importance of having a hobby. You, who are confined all day, take up something that is entirely different from your regular occupation for your spare moments. What I would like you to do, and especially the young ladies of the town, is to study some branch of natural history.

Some time ago I had a talk with Lady Aberdeen on this subject. She is very much interested in the welfare of this country and its people. We were talking about this matter, and I was deploring the lack of this sort of study by our young ladies. In England it is quite common but not in this country. There are plenty of ladies in Port

Hope who would find their life much more pleasant to them if they would take up something of this kind. I believe the Ladies' Club have lately had a scientific lecture, and I am glad of that.

One study they might take up is botany, or some like shells and fossils; others, again, collecting postage stamps. But take something, no matter what it is, and make that something the whole object of study for your spare moments. Many people go for a walk for exercise. If you are a student of botany you will find something interesting at every step; if you are making a collection, you will find something to add to your collection. I should be glad to see the ladies of this town take up botany and other natural history studies.

I might mention that the greatest entomologist in Great Britain is a lady, Miss Ormerod. These diagrams that you see here are the work of her sister and herself. She is the standard authority in England, and has been consulted by the Governments of Russia, India and others. A few days ago I received her eleventh annual report. She devotes her whole time to the pursuit, and without any encouragement whatever from the Government. Happily, she is a lady of means, and is able to do it. If you read the periodicals you will find mention made of her from time to time. I mention this as a bright example, but there are other ladies who have distinguished themselves in different directions. So you see what a lady can do:

In closing, let me say that every one cannot be famous, but you can derive great pleasure by studying some of the wonderful works of the Divine Creator.

Mr. T. H. RACE, of Mitchell, representing the Ontario Fruit Growers' Association, was then introduced by the chairman, and proceeded to give an address on "The Cultivation of Roses."

TRENTON.

OFFICERS FOR 1896.

President.—W. H. BERKINSHAW.

Vice-President.—R. FRASER.

2nd Vice-President.—W. H. DEMPSEY.

Secretary-Treasurer.—S. J. YOUNG.

Directors.—MESDAMES J. W. HYDE, W. H. BERKINSHAW, J. H. STEWART, MISS JEFFS, and MESSRS. J. B. YOUNG, JAS. CRAIG, R. M. FOSTER, J. B. CHRISTIE and D. J. HAWLEY.

Auditors.—MESSRS. D. E. CLARKE and J. NICHOLSON.

WATERLOO.

OFFICERS FOR 1896.

President.—JAMES LOCKIE.

1st Vice-President.—CHAS. MOOGK.

2nd Vice-President.—MRS. P. HOHMEIER.

Secretary-Treasurer.—W. A. RAYMO.

Directors.—MRS. GEO. WEGENAST, MRS. J. H. WEBB, MISS M. BRUCE, MESSRS. GEO. BULDUC, C. M. TAYLOR, J. H. WINKLER, WM. HENDRY, J. H. ROOS.

Auditors.—GEORGE DAVIDSON, LEVI SHUH.

Following is the

DIRECTORS' REPORT.

Your Directors, in making their first Annual Report, have much pleasure in congratulating the members on the success of the Society. From its inception it has been well received and seems to be steadily growing in public favor.

We have had a membership of seventy, each of whom received *The Canadian Horticulturist* and bound report of the Ontario Fruit Growers' Association, and a share of the plant distribution connected, twenty Gladioli bulbs, one Canna and two tuberous rooted Begonias; besides, the Society made a gift to the town of a circular flower bed in the public park, containing 175 Dwarf Cannas with a border two feet wide of Phlox Drummondii, which was much appreciated by the public, and we trust the Park Commissioners will continue the work thus begun and cause several flower plots and ornamental trees and shrubs to be planted in the different parks in future.

The year 1895 was unfavorable for horticulture in many respects. The frosts of May almost completely destroyed the small fruit crop of this section and cut back early vegetables and flowers. The weather during the season was very irregular and uncertain, alternating from the extreme heat to cool, even cold, weather, with frost every month.

Your Society has held a number of meetings open to the public, where papers on horticultural subjects have been read and discussed with increasing interest, and we trust our successors will continue such meetings in future and that the attendance may increase; as apart from the benefits to be derived from an interchange of ideas on horticultural topics, they also cultivate the social qualities and make better neighbors and citizens.

The Fruit Growers' Association of Ontario, with which this Society is affiliated, hold their annual meetings in different places each year in order to increase the interest in fruit growing in different localities. Your Directors made an effort to get it here next winter, but having been held in the western section for some years it was decided to hold the next in Kingston, but we are promised it in the near future, and we trust our successors in office will succeed in getting this meeting at Waterloo in 1897.

The Secretary-Treasurer's and Auditors' reports are before you by which you will see the Society is in a good financial position, the funds having been husbanded with care, and by the circular just issued you will see the advantages to members for this year are much greater than last, so that we look with confidence to the increasing influence of this Society and expect it to be one of the most beneficial and permanent institutions of our thriving town.

By order of the Board.

JAS. LOCKIE,
President.

WOODSTOCK.

OFFICERS FOR 1896.

President.—D. W. KARN.

Vice-President.—G. R. PATTULLO.

Secretary.—R. B. THORNTON.

Treasurer.—J. S. SCARFF.

Directors.—E. HERSEE, M. S. SCHELL, F. MITCHELL, FRANK HARRIS, E. W. SNELGROVE, WM. NEWTON, R. W. KEILER, J. S. SCARFF and T. H. PARKER.

Auditors.—JOHN PIKE and T. L. CLARKSON.

INDEX.

	PAGE.		PAGE.
Address by Hon. John Dryden.....	45	Duchesse Precoce Pear.....	33
Address of Welcome	45	Early Rivers Peach	58
Affiliated Societies	96, 115	Ella Apple	98
Agassiz Experiment Farm	56	Empress Apple	99
Annapolis Valley, Apple growing in	51	Experimental Shipment of Fruit to England. 77	77
Annual Meeting	3	Export Trade in Apples and Other Fruits. 77, 105	77, 105
Apple Barrel, Legal capacity of	109	Fallowater Apple	59
Apple Blossom, The	26	Fameuse Apple	13
Apple Culture.....	8	Fertilizing the Orchard	9, 10, 34, 60
Apple Growing in the Upper St. Lawrence Valley	12	Finance Committee, Report of	95
Apple Scab	60	Forest Trees, Preservation of	5
Apples, Export trade in	77, 105	Fraud in the Sale of Fruit, Act for the prevention of	75, 109
Apples for Market	58	Fruit Committee	5
Ashes.....	40	Fruit Crop of 1895 in the Ottawa Valley....	103
Baldwin Apple	31, 114	Fruit Exhibitions and how to make them	
Bank's Red Gravenstein Apple.....	51	Educative.....	20
Barrel, Legal capacity of.....	109	Fruit Exhibit, Report of Committee on	100
Baxter Apple	13	Fruit Experiment Stations.....	23
Bees in the Orchard	28, 30	Fruit Growing, Profits of	41
Ben Davis Apple	105, 114	Fruit in the Market, Green	5
Black Knot	66	Fruit Trade, Present day requirements of....	68
Blight of Pear.....	38	Geranium, Varieties.....	
Blooming Period of Fruit Trees.....	25, 27	Gladiolus, The	118
Bordeaux Mixture	61	Gladiolus, Depth of planting.....	82
Brampton Horticultural Society	118	Gladiolus, Hybrids of	82
Brandon Experiment Farm	55	Gladiolus, The improvement of.....	81
Breckenridge Apple	109	Golden Russet Apple	13
British Columbia as an Apple Market	18	Grading and Packing Fruit	38, 73, 113
British Columbia as an Apple Producing Country	72	Grapes, Exporting	107
Brockville Beauty Apple	13	Grapes, Frozen	6
Buckwheat in the Orchard.	12	Grapes, Immature	6
Bud Moth	66	Grape, Thrip	19
Burlington Horticultural Society.....	117	Gravenstein Apple	51
Canada Red Apple	13	Green Fruit.....	6
Cannas	91	Green Apple for Export.....	109
Central Experimental Farm	52	Grimsby Horticultural Society.....	118
Charlie Apple.....	98	Hagersville Horticultural Society	119
Chatham Horticultural Society	118	Harold Apple	97
Cigar-shaped Case Bearer	14	Hill's Chili Peach	58
Clover as an Orchard crop	10	Horticultural Work at the Dom. Exp. Farms,	
Codling Moth.....	60	Progress of.....	49
Cold Storage, Co-operative	7	Horticulture at the O. A. C.....	47
Co-operative Fruit Selling	6	House Plants, Cultivation and Management of	87
Conservatories, Private	46	House Plants, The Garden and.....	90
Cranberry Pippin Apple.....	11	Indian Head Experiment Farm	16
Crops in the Orchard	9	Insect Life	122
Crosby Peach	58	Inspection of Fruit	16
Cultivation and Spraying of Orchard, The...	59	Jordan Apple	98
Diamond Apple.....	99	Kean's Seedling Apple	99
Diseases of Fruit Trees	4	Keiffer Pear.....	37, 40
Duchess Apple	12	Kerosene Emulsion	15
		King Apple.....	43

	PAGE.		
Labelling Fruit	21	Private Conservatories.....	46
Leamington Horticultural Society	113	Prize Lists	21
Letter of Transmittal	1	Pyrus Baccata	55
Letters of Introduction	19	Question Drawer.....	19, 58
Lindsay Horticultural Society	120	Raspberries for Home Use.....	104
Longfield Apple.....	13	Red Astrachan Apple	13
Lye as a Tree Wash.....	11	Red Rock Apple	99
Manitoba Wild Plum	55	Resolutions, Committee on	5
Marketing Fruit.....	39, 70	Resolutions	115
Mice in the Orchard.....	36	Roses, Winter protection of	54
Monarda Didyma	91	Rose Thrip	19
Moore's Ruby Currant.....	104	Sand Cherry.....	55
McIntosh Red Apple	13	Scarlet Pippin Apple	13, 101
McLeod Apple	99	Secretary, Report of.....	95
Napanee Horticultural Society.....	120	Seedling Fruits	97
Pananee Experiment Farm	52	Sheldon Pear	37
New Fruit Committee.....	5	Shipment of Fruit, Experimental	4
New Fruit Committee, Report of.....	97	Shipping Apples to British Columbia	16
Niagara Falls Horticultural Society	120	Sod in the Orchard	8
Nitrate of Soda for House Plants.....	89	Soil for the Pear	40
Nominating Committee	5	Spraying	14
Nonpareil Apple	51	Spraying and Cultivation of the Orchard	59
Northern Spy Apple.....	16, 105, 113	Spraying Experiments	4
Northern Spy Self-Sterile	29	Spraying Experiments in 1895	62
Officers for 1896	2	Stark Apple.....	58
Ontario Agricultural College and Horticulture	47	Sterility of Varieties of Fruit	29
Ontario Apple.....	59	St. Lawrence Apple.....	12
Orchard Crops	9	Strawberries, Methods of originating new varieties of	102
Packages for Apples.....	106	Swamp Muck	14
Packages, Sizes of.....	74	Talman Sweet as Stock for Grafting	42
Packing	17, 34	Tent Caterpillar.....	60
Packing and Grading Fruit	73	Tomatoes, Exporting	108
Paris Horticultural Society	120	Top Grafting Pears	38
Parks and Gardens.....	84	Transportation, Loss of Fruit in	8
Peaches for Oxford County	58	Transportation of Apples	107
Pear Blight.....	38	Treasurer's Report.....	95
Pear Growing for Profit	33	Trenton Horticultural Society	125
Percy Apple	98	Tuberous Begonia	92
Picking Fruit.....	5, 34	Tyson Pear	37
Pillaging of our Gardens.....	121	Varieties to Plant	10
Pioneer Apple.....	99	Varieties in Orchard, Mixing	26
Plant Distribution for 1895	96	Watering Plants.....	89, 90
Planting an Orchard.....	11	Waterloo Horticultural Society	125
Plants for the House, Care of.....	87, 90	Wealthy Apple	13
Plum Weevil	123	Wilder Currant	104
Pony Barrel	113	Wilmot Pear	33
Port Colborne Horticultural Society	121	Winter Protection of Roses	54
Port Hope Horticultural Society.....	121	Wood Ashes	60
Present Day Requirements of our Fruit Trade	68	Woodstock Horticultural Society.....	126
President's Address	3	Yellow Transparent Apple	13

SECOND ANNUAL REPORT
OF THE
FRUIT EXPERIMENT STATIONS
OF
ONTARIO

UNDER THE JOINT CONTROL OF THE
ONTARIO AGRICULTURAL COLLEGE, GUELPH,
AND THE
FRUIT GROWERS' ASSOCIATION OF ONTARIO.

1895.

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

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.



TORONTO:
WARWICK BROS. & RUTTER, PRINTERS ETC. 68 AND 70 FRONT ST. WEST.
1896



CONTENTS.

LETTER OF TRANSMITTAL	5
OFFICERS	6
LIST OF STATIONS AND EXPERIMENTERS	6
CANADIAN FRUITS AND FRUIT TREES.....	7
Apples, 7—Pears, 12.	
MEETING OF BOARD OF CONTROL.....	17
Report of Secretary.....	18
List of Trees added to Stations in Spring of 1895.....	19
Visits to Experimenters.....	23
Exhibit at Industrial Exhibition.....	23
Experimental Shipment of Apples to Australia.....	24
Financial Statement.....	31
Future Plans.....	31
Reports from Stations.....	31
Apples—Bay of Quinte Station.....	32
Outlines of Apples.....	38
Apples—Simcoe Station.....	46
Notes on Varieties—Simcoe Station.....	48
Pears—Bay of Quinte Station.....	50
Plums—Georgian Bay Station.....	52
Notes on Varieties—Georgian Bay Station.....	54
Peaches—Southwestern Station.....	55
Notes on Varieties—Southwestern Station.....	56
Peaches—Hints on Cultivation.....	59
Grapes—Wentworth Station.....	60
Grapes—Record for 1895.....	62
Cherries—Notes on Varieties.....	63
THIRD ANNUAL MEETING OF BOARD OF CONTROL.....	66
Inspection of Stations.....	67
Proposed new Stations.....	70
Gooseberries.....	73
Strawberries.....	77
Strawberry Notes.....	84
Burlington.....	95
CATALOGUE OF FRUITS FOR THE USE OF PLANTERS	99
Apples, 99 ; Pears, 100 ; Grapes, 101 ; Strawberries, 102 ; Gooseberries, 103.	
APPENDIX A.	
REPORT OF THE DIRECTOR OF EXPERIMENTAL SPRAYING.....	105
APPENDIX B.	
SPRAY PUMPS	117

SECOND ANNUAL REPORT
OF THE
FRUIT EXPERIMENT STATIONS OF ONTARIO,
1895.

To the Honorable the Minister of Agriculture for Ontario :

SIR—The second Annual Report of the Fruit Experimental Work in Ontario, which I have now the honor of placing before you, will show the progress of our fruit stations in testing varieties. The experimenters are beginning their tests with old varieties, and afterward will be in a position to judge of the comparative merits of the newer varieties.

The Board of Control has now established ten stations and two sub-stations, and it is hoped that these will fairly represent the conditions of the various parts of the Province, excepting those too far north to be adapted to profitable fruit culture.

An important feature of the work is that undertaken by the secretary, viz., a descriptive work of the fruits of Ontario, a work necessarily slow and requiring much patient study of varieties under the varying conditions found at the various stations, but in the end it is intended to constitute in a compact form the results of the work of all our stations. When sufficiently advanced, this may be published in a volume separate from the Annual Report and thus will constitute a book of reference for fruit growers.

The Report of the Director of Experimental Spraying also forms an important part of this report.

All of which is respectfully submitted.

We have the honor to be, Sir,

Your obedient servants,

JAMES MILLS,
Chairman, Guelph, Ont.

L. WOOLVERTON,
Secretary, Grimsby, Ont.

BOARD OF CONTROL, 1896.

REPRESENTING THE COLLEGE,

JAMES MILLS, M.A., LL.D., Guelph..... President.
 H. L. HUTT, B.S.A., Guelph Horticulturist.

REPRESENTING THE FRUIT GROWERS' ASSOCIATION FOR 1896.

A. M. SMITH.....St. Catharines.
 A. H. PETTIT Grimsby.
 W. E. WELLINGTON Toronto.
 L. WOOLVERTON, M.A., Secretary..... Grimsby.

EXECUTIVE COMMITTEE.

Chairman—JAMES MILLS, M.A., LL.D.
Secretary—L. WOOLVERTON, M.A.
Official Visitor—H. L. HUTT, B.S.A.

THE ONTARIO FRUIT EXPERIMENT STATIONS.

<i>Name.</i>	<i>Specialty.</i>	<i>Experimenter.</i>
1. Southwestern.....	Peaches.....	W. W. Hilborn, Leamington, Ont.
2. Niagara.....	Tender Fruits.....	Martin Burrill, St. Catharines, Ont.
3. Wentworth.....	Grapes.....	M. Pettit, Winona, Ont.
4. Burlington.....	{ Blackberries and Currants }	..... A. W. Peart, Freeman, Ont.
4½. Halton sub-station.....	Strawberries.....	E. B. Stevenson, Freeman, Ont.
5. Lake Huron.....	{ Raspberries and Commercial Apples. }	..... A. E. Sherrington, Walkerton, Ont
6. Georgian Bay.....	Plums.....	John G. Mitchell, Clarksburg, Ont.
7. Simcoe.....	{ Hardy apples and hardy cherries. }	.. G. C. Caston, Craighurst, Ont.
7½. Simcoe sub-station.....	Gooseberries.....	S. Spillett, Nantye, Ont.
8. East Central.....	{ Pears and Commercial Apples. }	R. L. Huggard, Whitby, Ont.
9. Bay of Quinte.....	Apples.....	W. H. Dempsey, Trenton, Ont.
10. St. Lawrence.....	{ Hardy Pears, Hardy Plums. }	..... Harold Jones, Maitland, Ont.

FRUIT EXPERIMENT STATIONS OF ONTARIO.

CANADIAN FRUITS AND FRUIT TREES.

Since we have in Canada no recognized authority upon Canadian fruits, it seems necessary for the best interests of Canadian fruit growers that such a work be undertaken as soon as possible. That grand work of Mr. A. J. Downing has been of inestimable value to the horticulturists of the United States, but even for that country this work needs a thorough revision ; while for Canada, many of its statements are wholly inapplicable. Besides this, it describes many varieties never grown in Canada and wholly undesirable.

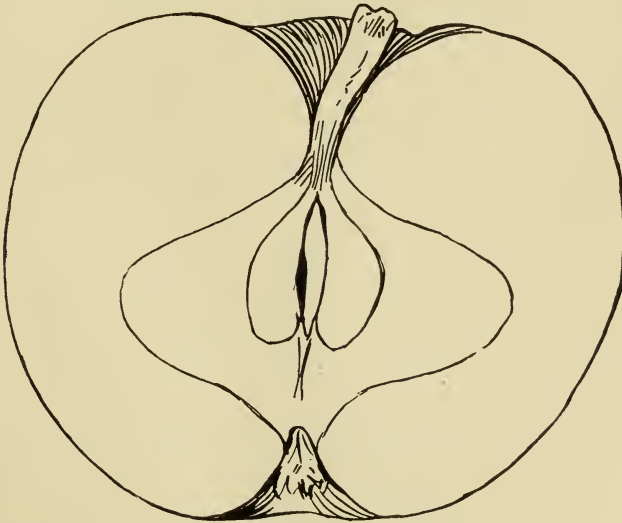
Toward supplying this need, your Secretary did a little work during the year 1895, and has incorporated a portion of it in this annual report in order to learn the mind of the Board of Control and of the Fruit Growers' Association with regard to the desirability of its being carried on in this manner from year to year as the practical outcome of the work of our Ontario fruit experiment stations.

L. WOOLVERTON,
Secretary.

GRIMSBY, Ontario.

APPLES.

BALDWIN. (Steele's Red Winter).



Section of Baldwin.

The Baldwin originated in the State of Massachusetts and was for many years the most popular winter apple for either home or foreign markets. The average yield each alternate year was about eight barrels per tree, and in some instances much larger. Large

orchards of this variety were in consequence planted in the apple growing counties of middle and southern Ontario, but unfortunately for many years now these orchards have been almost barren, and many of them are being dug out as worthless. The cause may be poverty of soil, the lack of pollen of other varieties to fertilize the blossoms, or the prevalence of apple scab. If it is the latter, it may be overcome with the Bordeaux mixture; if lack of potent pollen, by grafting in other varieties here and there through the orchard.

TREE, upright, spreading, vigorous grower, formerly very productive.

FRUIT, large, roundish, ovate; skin yellow, shaded and splashed with crimson and red, dotted with some russet dots; stem heavy, three-quarters of an inch long, in a broad cavity; calyx, closed, in a deep plaited basin.

FLESH, yellowish white, tender, sub-acid; quality, second class.

SEASON of use, January to March.

ADAPTATION. Not very hardy at Simcoe station or in North Ontario county; further south and along the borders of the lakes, this apple may be grown to perfection, if the scab can be kept off the trees.

CABASHEA. (Twenty Ounce Pippin).

ORIGIN Not worth planting in Ontario. Through confusing its name with that of the Cayuga Red Streak, often called Twenty Ounce, this apple has been widely planted in our province. The tree is unproductive and the fruit, though large and fine in appearance, drops early and is poor in quality. Twenty trees, at Maplehurst, twenty years planted, yielded about ten barrels of apples in 1895, the best so far.



Section of Cabashea.

ORIGIN, unknown.

TREE, vigorous, spreading, unproductive.

FRUIT, large, roundish, oblate, slightly conical; skin, yellowish green, shaded with dull red on the sunny side; stem, an inch long, stout, in a wide cavity of moderate depth; calyx open in a wide shallow basin; core medium.

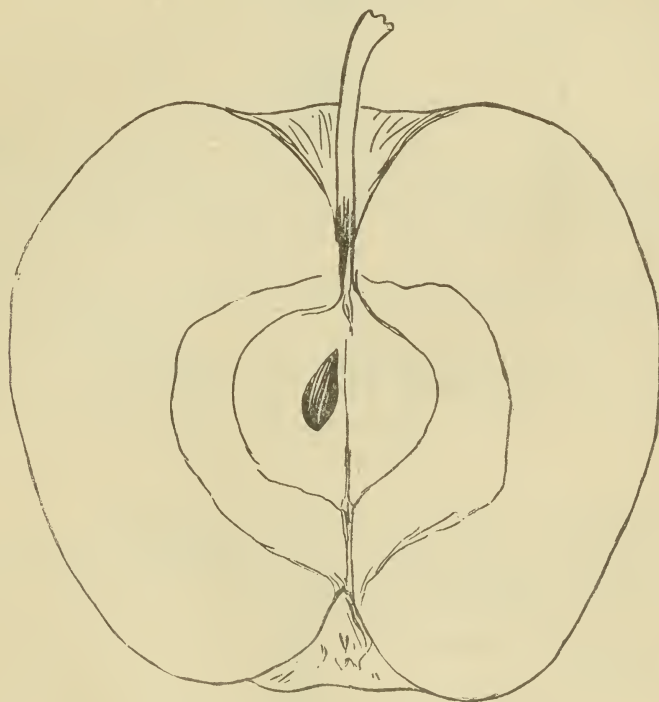
FLESH, white, firm, coarse, sub-acid, only fair for cooking, useless for dessert.

SEASON, October to December. At Bay of Quinte station, season given from December to February.

Tested, twenty years at Maplehurst, Grimsby.

CRANBERRY PIPPIN.

An apple that is worthy of being planted in Southern Ontario as a fancy variety for export. Though the quality is ordinary and not suitable for dessert, its extreme beauty when opened in midwinter, its large and even size, usual freedom from blemishes and the productiveness of the tree every alternate year, make it a desirable variety. At Maplehurst, Grimsby, in 1895, fifty trees of this variety, about twenty years planted, yielded 200 barrels of high grade apples, and in 1893, when other varieties were almost worthless, nearly the same quantity. Sometimes, however, this variety is subject to warts and knots which mar its beauty.



Section of Cranberry Pippin.

ORIGIN. Accidental on a farm, near Hudson River, N.Y.

TREE, very vigorous, healthy, spreading, productive.

FRUIT, medium to large, roundish oblate; skin, smooth, yellow shaded and striped with two shades of red; stem, slender, one and one-eighth inches long in a deep cavity; calyx closed in a wide, wrinkled basin.

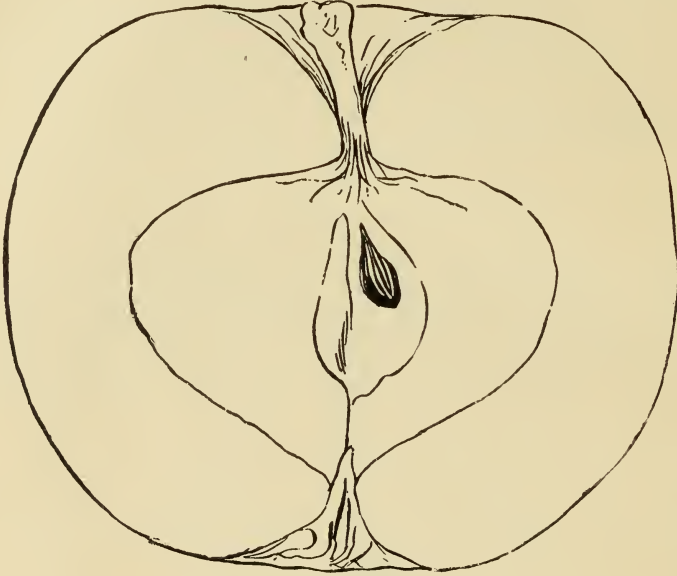
FLESH, white, firm, crisp, moderately juicy, sub-acid; quality, second class.

SEASON. November to February.

ADAPTATION. Southern portions of the province, especially clay border of the lakes.

KING. (King of Tompkins' County.)

Said to have originated in New Jersey. On account of its excellent quality for cooking, its peculiarly rich aromatic flavor, its beautiful appearance and large size, this apple is taking the highest place in the great apple markets of the world. Unfortunately the tree is a poor bearer, and consequently unprofitable as an orchard variety, unless under exceptional circumstances. Top-grafted on Tolman Sweet, it is said to be more productive. For home use it is excelled by no apple.



Section of King.

TREE, a vigorous grower, of spreading habit, but not long-lived.

FRUIT, large, roundish, uneven; skin, yellowish, shading off from red to dark crimson; stem, short and stout, inserted in a wide, deep, somewhat irregular cavity; calyx closed in a broad, shallow, slightly corrugated basin.

FLESH, yellowish, white, crisp and juicy, moderately firm; flavor rich, agreeable, aromatic; quality first-class.

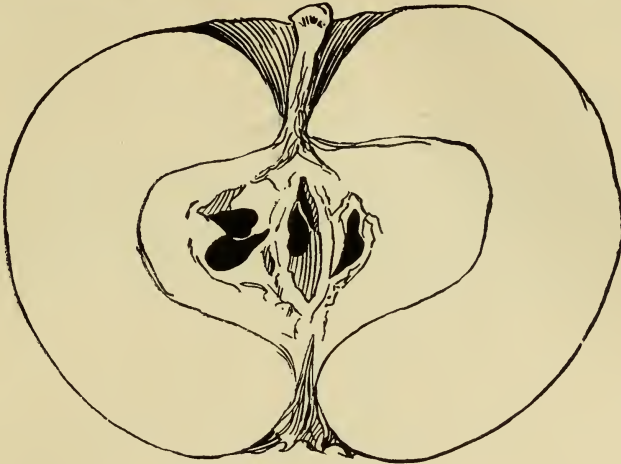
SEASON, October to February in Southern Ontario; reported at the Simcoe station, October to March for Northern Ontario.

ADAPTATION. Not hardy at Simcoe station unless top-grafted on Tolman Sweet, or some other hardy stock, and, therefore, it is not recommended for planting in northern sections.

RED ASTRACHAN.

Imported from Sweden to England in 1816, and widely planted in Southern Ontario for a summer market apple. Scarce another apple of its season equals it in beauty of appearance, for, in addition to its rich crimson color, it is often covered with a pale white

bloom. Selected fancy grades of this apple are usually in good demand in our home markets, but sometimes there is a surplus, and prices even for Astrachans are very low.



Section of Red Astrachan.

TREE, upright ; very vigorous ; begins bearing early ; very productive.

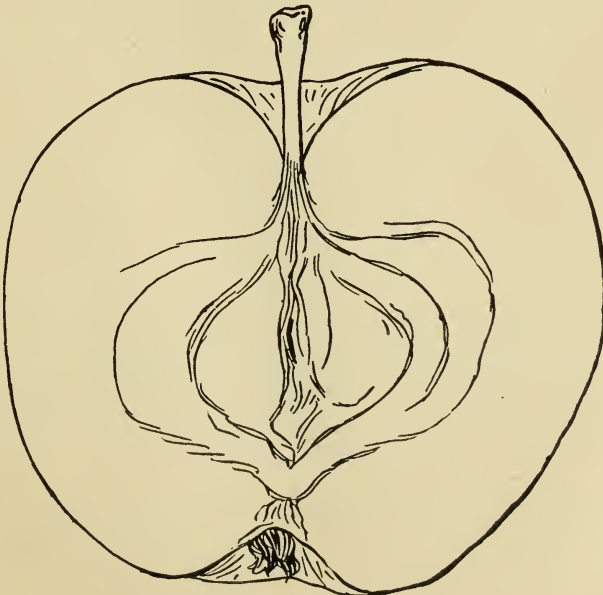
FRUIT, medium to large, round, narrowing toward apex ; skin, deep crimson when exposed to sun, yellowish-green in shade, often covered with a thin, whitish bloom ; stem, stout, three-quarter inch long, in a deep, narrow cavity ; calyx closed in a shallow, somewhat irregular basin.

FLESH, white, crisp, juicy, tender, becoming mealy when over-ripe ; acid almost too tart to be counted first-class for either dessert or cooking ; quality, second class.

SEASON, 1st to 20th August.

ADAPTATION. In Niagara district perfectly hardy and productive. Two trees in 1895 at Maplehurst averaged ten barrels each. Not considered profitable at Simcoe station ; not hardy in northern parts of Ontario county.

YELLOW TRANSPARENT.



Yellow Transparent.

An apple which may prove a substitute for the well-known Early Harvest, which is so subject to apple scab. This variety seems to be proof against fusicladium, both in leaf and fruit.

ORIGIN, St. Petersburg, Russia. Imported by the U.S. Department of Agriculture in 1870.

TREE, hardy, vigorous, upright, annual bearer, productive, began bearing at four years at Craighurst station.

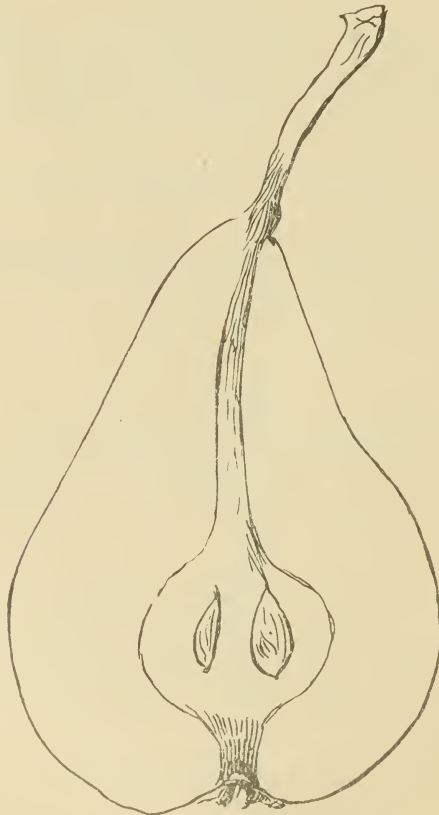
FRUIT, above medium, roundish, oblate, inclined to be conical; skin, clear white, yellowish white when very mature; dots, light green, obscure; stalk, medium, in large cavity; calyx closed in medium slightly corrugated basin; fruit hangs well on the tree.

FLESH, white; firm till very ripe, then tender; quality, second class.

ADAPTATION. Tested at Maplehurst, Grimsby; at Simcoe station, and distributed widely by Ontario Fruit Growers' Association in 1886.

PEARS.

BEURRE GIFFARD.



Section of Beurre Giffard.

An excellent early summer pear, of large size and good quality. Probably 1.0 pear of its season is more desirable both for home use and market.

ORIGIN. Chance seedling with M. Giffard, Angers, France.

TREE, moderately vigorous, healthy and productive.

FRUIT, medium, acute pyriform ; skin, greenish-yellow, shaded with red in the sun ; calyx closed in a very shallow basin.

FLESH, white, melting, agreeable aromatic flavor.

SEASON, August.

Tested on top graft four years at Maplehurst, Grimsby ; also at the Wentworth Experiment Station.

BUFFUM.

A reliable kind for health of tree and productiveness, but its season follows the Bartlett too closely to be of any great value in the market. Besides, there are other varieties of about the same season which are more desirable for both table and market, for the fruit is often below medium size and of only fair quality.



Section of Buffum.

ORIGIN  Rhode Island.

TREE, very upright, vigorous, productive, not subject to blight.

FRUIT, medium, oblong, obovate, slightly one-sided ; skin, yellowish, with a brownish-red cheek, with small brown dots ; stalk, one inch long, in a very small cavity ; calyx closed in a small regular basin.

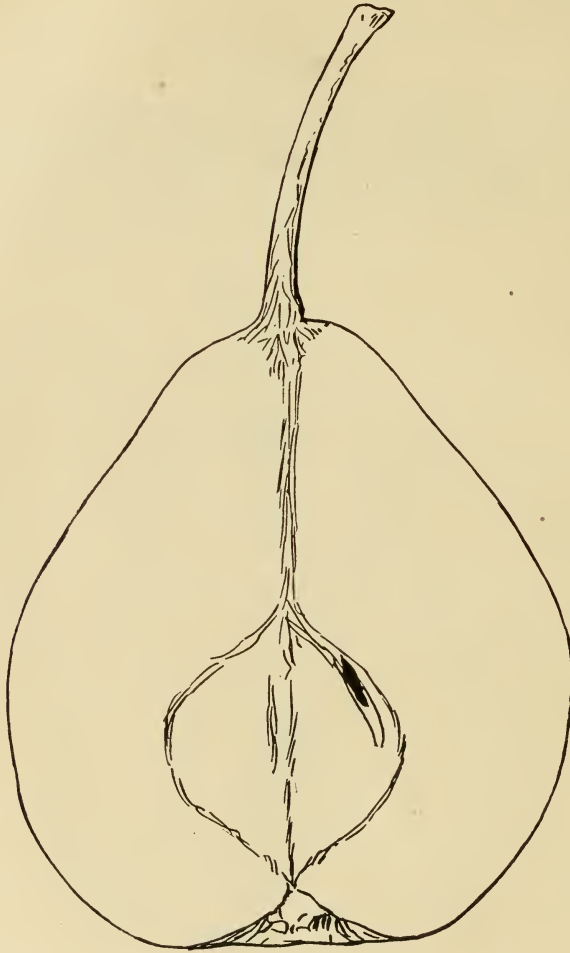
FLESH, white, buttery, moderately juicy, slightly granular, of agreeable aromatic flavor.

SEASON, September 20th to October 1st.

Tested at Maplehurst thirty years.

HOWELL.

One of the best market pears of its season for Southern Ontario, especially when grown on a standard. Its vigor of tree, regularity of bearing, clear skin, and good size and quality make it a desirable variety for the commercial orchard.



Section of Howell.

ORIGIN. New Haven, Conn. Named after the originator, Thomas Howell.

TREE, upright, healthy and vigorous, an early bearer, productive.

FRUIT, large, obovate pyriform; skin, yellowish green, waxy, reddish dots on sunny side, russet dots in shade; stem one and three-quarter inches long; no cavity, sometimes lipped; calyx partly open in a deep russeted basin; core small; seeds few, small.

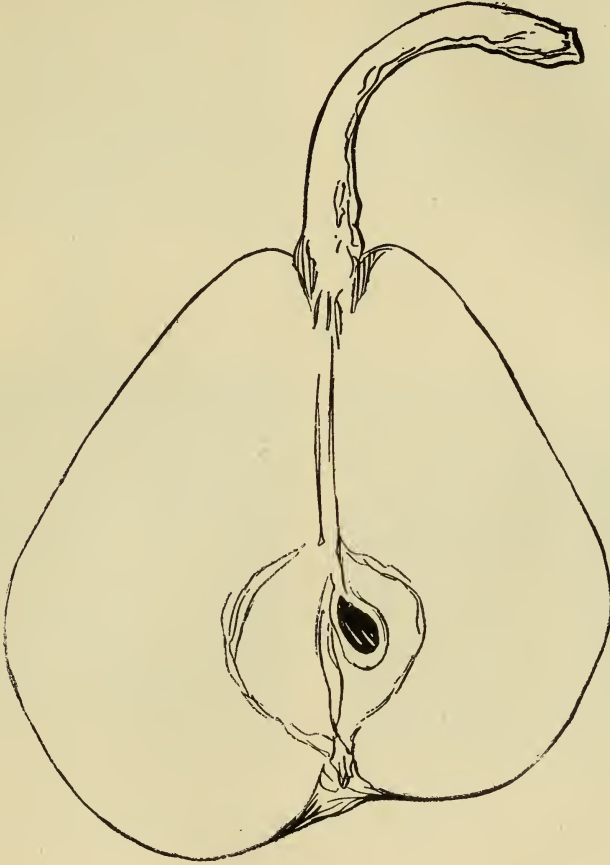
FLESH, creamy white, juicy, melting, granular near the core; flavor agreeable vinous; rather tart for dessert.

SEASON, middle September to middle of October.

Tested twenty-five years at Maplehurst, Grimsby.

KING SESSING.

A worthless variety for either home use or market, because it always decays at the core, while still apparently sound.



Section of King Sessing.

ORIGIN. Near Philadelphia.

TREE, fairly vigorous, of sprawling habit.

FRUIT, large, obovate, obtuse pyriform; skin, greenish-yellow, with minute greenish dots; stem, two inches long, curved, fleshy at its insertion in a small uneven cavity; calyx small, closed in a deep irregular basin; core small, inclined to rot.

FLESH, whitish, juicy, melting, and of good flavor.

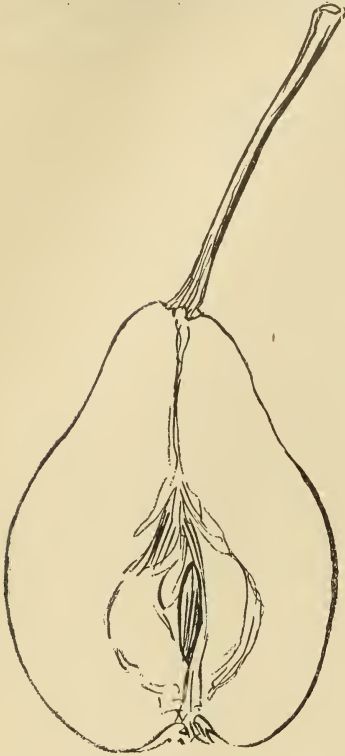
SEASON, September 20th to October 1st.

Tested thirty years at Maplehurst.

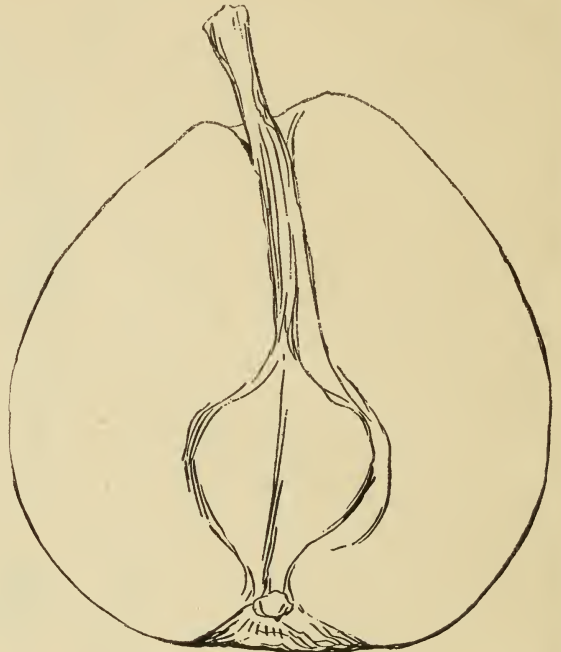
ROSTIEZER.

A small unattractive looking pear, of very high quality. It is the best of its season in quality for dessert purposes, and should have a place in the home garden. What the

Seckel is in October, this pear is in August. Packed in small packages and labelled "extra quality dessert pears," the writer was able to sell them at a fancy price, but usually the pear sells far below its value on account of its ordinary appearance.



Section of Rostiezer.



Section of Sheldon.

ORIGIN. Foreign.

TREE, healthy, vigorous, sprawling habits, shoots few, and need shortening in.

FRUIT, small to medium, obovate, oblong pyriform; skin, green, sometimes turning yellowish, with reddish-brown cheek; stem slender and nearly two inches in length; calyx open; basin small.

FLESH, juicy, melting, sweet, very delicious, of very finest quality.

SEASON, middle to end of August.

Tested twenty years at Maplehurst.

SHELDON.

One of the most delicious of dessert pears, if eaten just at the proper time. Worthy of a place in every home garden, but not productive enough to be planted for market.

ORIGIN. Accidental on farm of Norman Sheldon of Huron, Wayne Co., N. Y.

TREE, vigorous, erect, not very productive, late coming into bearing.

FRUIT, above medium in size, roundish, obtuse obovate; skin, yellowish-green, covered with thin light russet, brownish crimson in sun, russet dots; stalk, short, stout, in a narrow cavity; calyx nearly open, in a broad basin.

FLESH, creamy, buttery, juicy, sweet, aromatic.

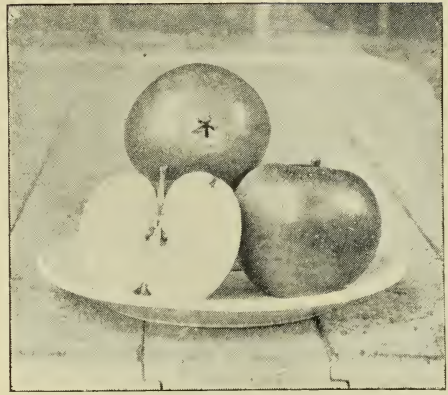
SEASON, October.

Tested twenty years at Maplehurst.

PLATE I.—ONTARIO GROWN APPLES.



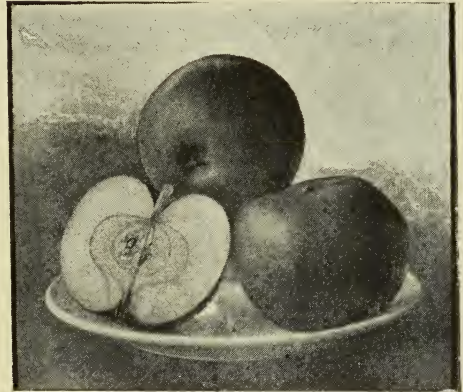
BALDWIN.



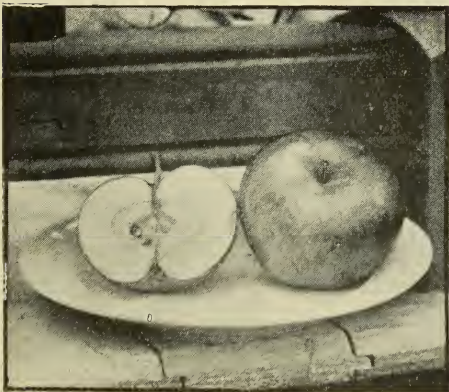
CABASHEA.



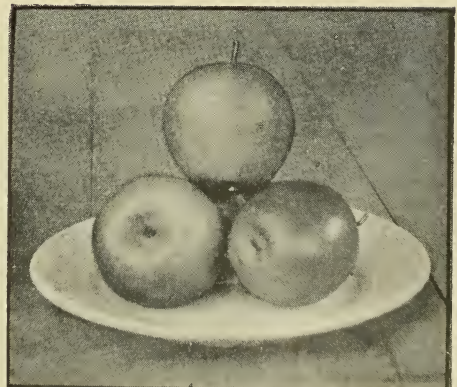
CRANBERRY PIPPIN.



KING.



RED ASTRACHAN.

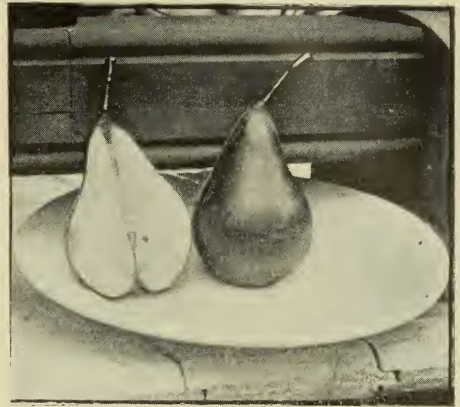


YELLOW TRANSPARENT.

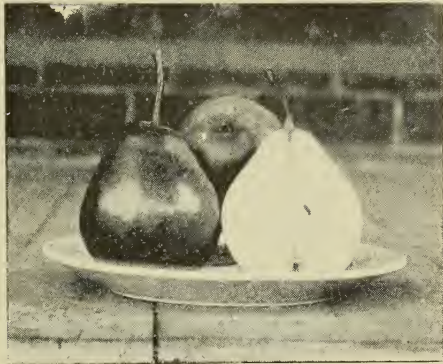
PLATE II.—ONTARIO GROWN PEARS.



BUFFUM.



GIFFARD.



HOWELL



KING SESSING.



ROSTIEZER



SHELDON.

MEETINGS OF BOARD OF CONTROL.

The second annual meeting of the Board of Control was held at the Ontario Agricultural College, Guelph, on the 17th of December, 1894, at 7.30 p.m., at the call of President Mills.

There were present the Chairman, Secretary, Official Visitor, and Messrs. A. H. Pettit, A. M. Smith and W. E. Wellington, the members who were appointed by the Ontario Fruit Growers' Association at Orillia on the 5th of December.

The minutes of the last meeting and the proposed report of the Board to the Department of Agriculture were read by the Secretary and duly criticized and amended.

It was ordered that this report, as amended, be submitted to the Minister of Agriculture.

A report of the visits to the various fruit experiment stations was made by Messrs. Hutt and Woolverton.

It was ordered that the Executive Committee be authorized to certify to the Department that the grants to the various experimenters had been properly deserved.

The Executive was asked to call the attention of the experimenters to the importance of planting all new varieties of trees and plants in plots where exact records could easily be made of their behavior, and to which access would be easy for the Official Visitor.

The applications for new stations were read by the Secretary, and the Official Visitor reporting favorably, Mr. John Mitchell, of Clarksburg, in the Beaver Valley, was duly appointed as one of our experimenters, his specialty being plums, but, in addition, he is to be asked to test certain varieties of pears, apples and cherries.

It was further ordered that, in case the conditions were found to be favorable, sub-stations for testing small fruits in particular be located in the counties of Halton and Simcoe.

It was ordered that experiments in spraying be conducted by our experimenters at such time and in such manner as shall be suggested by the Executive Committee.

It was ordered that a copy of Downing's "Fruits and Fruit Trees of America" be furnished each experimenter free of charge.

At a committee meeting of the Executive, held on Wednesday morning, December 19th, it was resolved that the following groups of counties should in some way be considered in the selection of the three stations still open for location :

1. Huron, Bruce and Lambton.
2. The counties bordering on the St. Lawrence river.
3. Victoria, Peterboro', Ontario, Durham, West Northumberland.

It was further thought desirable to locate in the Niagara district, as soon as possible, another station for the special purpose of testing the most tender fruits.



A special meeting of the Board of Control was held at the Walker House, Toronto, at 10.30 a.m., on Friday, February 22nd.

There were present President Mills, Secretary Woolverton, Prof. Hutt and Messrs. W. E. Wellington, A. M. Smith and A. H. Pettit.

In response to a request from the Minister of Agriculture regarding a scheme for special experimental work in spraying, this subject was first discussed.

A scheme was presented by Mr. A. H. Pettit, and it was ordered that we recommend that the experiments be made in three divisions of Ontario, and in about ten ridings in each, as follows :

Division 1.—Essex, Kent, Norfolk, Haldimand, Monck, Welland.

Division 2.—South Ontario, Durham, Northumberland West, Prince Edward, Lennox, Frontenac, Leeds, Grenville, Dundas.

Division 3.—Lambton, Bruce, Central and South Grey, Simcoe.

It was recommended that the work be done thoroughly according to the following list of applications :

1. Sulphate of copper before the leaves appear.
2. Bordeaux mixture before the blossoms open.
3. Bordeaux mixture after the bloom falls.
- 4, 5 and 6. Bordeaux mixture at intervals of ten or twelve days.

The estimates of expenditure were then made and discussed.

It was further ordered that, if possible, it is considered by this Board desirable to secure the services of Mr. A. H. Pettit (1) to make preliminary visits, (2) to secure proper men to do the work and thoroughly instruct them, and (3) at the close of the season to visit the various places and prepare careful records of the results for publication.

At an adjourned meeting of the Board, held at the office of Mr. W. E. Wellington, the minutes of the previous meetings were read and approved.

Applications from various gentlemen desiring to be appointed as experimenters were read and considered.

The Visitation Committee was ordered to pay visits to the more desirable of these applicants during the coming season.

It was ordered that the Industrial Exhibition be asked to allow space to the Board of Control for a special exhibit of fruit from the Ontario fruit experiment stations, it being understood that the exhibit would not be in competition for prizes.

It was ordered that our experimenters be asked to make their best efforts in the forwarding of an exhibit to the Industrial.

The Secretary having placed upon the table extensive lists of varieties of plants and trees which, in his opinion, it is desirable to have tested at the various stations, it was ordered that the Secretary and Messrs. Hutt, Wellington and Smith constitute a committee to revise these lists previous to the stock being ordered.

REPORT OF SECRETARY.

Under this head the Secretary desires to report certain work that has been conducted under the authority of the Board of Control or of the Executive during the interim between the meetings.

In the first place lists of the new and old fruits, which had been prepared for the various stations, were approved by the committee appointed by the Board for the purpose of examining them. The Secretary then corresponded with the various experimenters concerning these lists, and after giving them a final revision, the stock was ordered from various nurserymen in Canada and the United States. Most of this stock was addressed to the Secretary, who paid all bills, and had them duly passed the customs and forwarded to the experimenters.

The list of trees and plants added in this way during the spring of 1895 is here given :

BAY OF QUINTE STATION.

APPLES.

Akin.	Esopus Spitzenburg.	Paragon.
Arkansas Black.	Fanny.	Peck's Pleasant.
Arkansas Beauty.	Gibson.	Rawle's Janet.
Bank's Red Gravenstein.	Hastings.	Rome Beauty.
Bishop Bourne.	Haskell's Sweet.	Red Canada.
Boiken.	Jefferson.	Starr.
Bogdenoff.	John Richardson.	Shackleford.
Carolina June.	Lady Sweet.	Ulter's Red.
Canada Reinette.	Late Strawberry.	White Pippin.
Cooper's Market.	Missouri Pippin.	Windsor Chief.
Clayton.	Mammoth Pippin.	Washington Strawberry.
Domine.	McLean.	York Imperial.
Early Harvest.	Palouse.	

PEARS.

A. Desportes.	Dr. Jules Guyot.	Manning's Elizabeth.
Ansault.	Easter Beurre.	Margaret.
Angouleme.	Fred Baudry.	Pound.
B. S. Fox.	Frederick Clapp.	P. Barry.
Beurre Giffard.	Keiffer.	Summer Doyenne.
Brandywine.	Lady Clapp.	Souvenir d'Esperen.
Col. Wilder.	Lucy Duke.	Winter Nelis.
Dorset.	Louise Bonne.	White Doyenne.
Duchess Precoce.	Lincoln.	

PLUMS.

Burbank.	McLaughlin.	Smith's Orleans.
DeSoto.	Orange.	Victoria.
Fellemburg.	Prune d'Agen.	Wild Goose.
Huling's Superb.	Reine Claude de Bavay.	Willard.
Imperial Gage.	Reine Claude Violette.	Yellow Gage.
Jefferson.		

VARIETIES PLANTED YEARS AGO BY MR. P. C. DEMPSEY, AND OMITTED FROM FIRST REPORT.

PLUMS.

Hudson River Purple Egg.	Monroe.	Richard Trotter.
Shippers' Pride.	Reine Claude.	No. 22.
German Prune.	General Hand.	Saunders.
McLaughlin.	Niagara.	Damson.
Beauty of Naples.	Niemetz.	

APPLES.

White Winter Parmain.	Red Gilliflower.	English Codling.
Powell.	Prinyea.	Ontario.
King.	Willow Twig.	Plumb's Cider.
Hastings.	Baltimore.	Swazie Pomme Gris.
Royal Russet.	Red Cathard.	Stott's Russett.
Reinette Grise.	Albury.	Arabka.

WENTWORTH STATION.

GRAPES.

America.	Elvicand.	Montefiore.
Berckman.	Eumedel.	Marion.
Beacon.	Gold Coin.	New Haven.
Bell.	Grayson.	Opal.
Black Delaware.	Geneva.	Olita.
Cambridge.	Janesville.	Ohio.
Carman.	Lutie.	Presley.
Dr. Collier.	Louisiana.	Rochester.
Early Ohio.	Mason Seedling.	Rommel.
Early Golden.		

PLUMS.

Abundance.	Jefferson.	Smith's Orleans.
Burbank.	McLaughlin.	Spaulding.
DeSoto.	Orange.	Satsuma.
Fellemborg.	Ogon.	Victoria.
Green Gage.	Prince Englebert.	Wild Goose.
Grand Duke.	Prune D'Agen.	Willard.
Huling's Superb.	Reine Claude de Bayay.	Weaver.
Imperial Gage.	Reine Claude Violette.	Yellow Gage.

CHERRIES.

Black Tartarian.	Early Richmond.	Ostheim.
Coe's Transparent.	Governor Wood.	Windsor.
Early Purple.	May Duke.	Yellow Spanish
Elkhorn.	Napoleon Bigarreau.	

PEARS.

B. S. Fox.	Dorset.	P. Barry.
Col. Wilder.	Lady Clapp.	

PEACHES.

Crosby.	Stewart.	Snow's Orange.
Elberta.		

[CURRANTS.

Black Naples.	Collin's Prolific.	Versailles.
Black Victoria.	Red Dutch.	

SIMCOE STATION.

APPLES.

Anisim.	Minnesota Winter crab.	Starr.
Bull's Seedling.	Magog Red Streak.	Sally Brown.
Bethel.	McMillan.	Sweet Bough.
Bank's Red Gravenstein.	Nodhead.	Sherwood's Favorite.
Cox's Orange Pippin.	Newton Pippin.	Salome.
Gano.	Orion crab.	Shackleford.
Gideon.	Primate.	Sweet Longfield.
Good Peasant.	Parson's Sweet.	Telfer Sweet Crab.
Hyslop Crab.	Peerless.	Tetofsky.
Hastings.	Paul's Imperial crab.	Utter's Red.
Isabella.	Picta Striata crab.	Vargul.
Jonathan.	Quaker Beauty crab.	Van Wyck crab.
Lubsk Queen.	Red Canada.	Whitney crab.
Martha crab.	Regel.	Wolf River.

PEARS.

Bessemianka.	Boussock.	Josephine de Malines
Bergamot.	Flemish Beauty.	Winter Nelis.
Baba.		

STRAWBERRIES.

Beder Wood.	Greenville.	Noble.
Banquet.	Henry Ward Beecher	Parker Earle.
Gandy.	Mary.	Timbrell.

SOUTH-WESTERN STATION.

PEACHES.

Astrander Early.	Dayton.	Fitzgerald.
Astrander Late.	Early Richmond.	Lorentz.
Champion.		

STRAWBERRIES.

Annie Laurie.
Australian.
Brandywine.
Brunette.
Belle.
Cyclone.
Eleanor.
Gardner.

Hilton Gem.
Jucunda Improved.
Laxton's Noble.
Latest of All.
Lord Suffield.
Laxton's No. 1.
Muskingum.
Marshall.

Noble.
Otsego.
Princess.
Staples.
Splendid.
Tennessee Prolific.
Watson.

SIMCOE SUB-STATION.

GOOSEBERRIES.

Crosby Seedling.
Chataqua.
Columbus.
Champion.

Crown Bob.
Golden Prolific.
Large Golden Prolific.
Lancashire Lad.

Mrs. Whittaker.
Red Jacket.
Rumbullion.
Triumph.

MAPLEHURST CHERRY STATION.

EXPERIMENTER—L, WOOLVERTON, GRIMSBY.

CHERRIES.

Black Tartarian.
Black Eagle.
Belle de Choisy.
Belle Magnifique.
Besserabian.
Cleveland.
Centennial.
Coe's Transparent.
Downer's Late.
Early Richmond.
English Morello.
Early Purple.

Elton.
Empress Eugenie.
Governor Wood.
Griotte du Nord.
Ida.
Kay's Morello.
Late Duke.
Lutovka.
May Duke.
Montmorency.
Napoleon Bigarreau.

Olivet.
Ohio Beauty.
Royal Duke.
Rockport.
Reine Hortense.
Sklanda.
Schmidt's Bigarreau.
Tradescant Black.
Windsor.
Wragg.
Yellow Spanish.

DWARF PEARS.

Anjou.
Ansault.
Andre Desportes.
Beurre Easter.
Belle Lucrative.
Bosc.
Boussock.
Beurre Giffard.
Col. Wilder.
Clairgeau.
Dana's Hovey.
Duhamel du Monceau.

Frederick Clapp.
Hoosic.
Hardy.
Jones.
Josephine de Malines.
Lady Clapp.
Lawrence.
Lawson.
Margaret.
Manning's Elizabeth.
P. Duchess.

P. Barry.
Reeder.
Souvenir du Congres.
Superfin.
Souvenir d'Esperen.
Summer Doyenne.
Sheldon.
Urbaniste.
Urbaniste.
Winter Nelis.
Wilder Early.

PEACHES.

Barnard.
Beer's Smock.
Bowslough Late.
Crosby.
Champion.
Elberta.
Garfield.

Hill's Child.
Hyne's Surprise.
Jacque's Rareripe.
Longhurst.
McConnell Seedling.
New Prolific.
Reeve's Favorite.

Smock.
Stephen's Rareripe.
Tyhurst.
Wonderful.
Wheatfield.
Yellow St. John.

APRICOTS.

Alexander.
Alberge de Montgamet.
Early Moorepark.

Gibb.
Nicholas.
Peach.

Red Mascallin.
Scoboloff.
St. Ambrose.

PLUMS.

Abundance.
Arch Duke.
Burbank.
Bradshaw.
Diamond.
Felleberg.
German Prune.
Gen. Hand.
Grand Duke.
Green Gage.
Gueii.
Huling's Superb.
H. R. Purple Egg.

Imperial Gage.
Jefferson.
Large Golden Prolific.
Moore's Arctic.
Monarch.
McLaughlin.
Ogon.
Orange.
Purple Egg.
Peter's Yellow Egg.
Prince of Wales.
Prince Englehert.
Quackenbos.

Reine Claude.
Satsuma.
Smith's Orleans.
Shipper's Pride.
Spaulding.
Victoria.
Willard.
Wild Goose.
Washington.
Weaver.
Yellow Egg.
Yellow Gage.

BURLINGTON STATION.

BLACKBERRIES.

Agawam.
Early Cluster.
Early Harvest.
Erie.
Gainor.

Hopkins.
Kittatinny.
Smith's Giant.
Snyder.

Stone's Hardy.
Taylor.
Western Triumph.
Wachussetts.

RASPBERRIES.

Cuthbert.]
Eureka.
Golden Queen
Gault.
Hilborn.
Highland Hardy.

Marlboro'.
Older.
Palmer.
Progress.
Royal Church.

Reliance.
Shaffer's Colossal.
Success.
Thompson's Early.
Turner.

GOOSEBERRIES.

Pearl.

GEORGIAN BAY STATION.

PLUMS.

Arch Duke.
Abundance.
Bickley.
Burbank.
Cheney.
Diamond.
Felleberg.
German Prune.
Gen. Hand.
Gueii.
Hugh's Seedling.
Hungarian Prune.
Huling's Superb.

H. R. Purple Egg.
Jefferson.
Large Yellow Prolific.
Montreal Yellow.
Moore's Arctic.
Monarch.
McLaughlin.
Orange Prune.
Peter's Yellow Gage.
Prune d'Agen.
Prince of Wales.
Quackenbos.
Reine Claude de Bavay.

Saunders.
Sand or Wyant.
Shipper's Pride.
Spaulding.
Stanton.
Ungarish Prune.
Wyant or Sand.
Wild Goose.
Weaver.
Willard.
Yellow.
Yellow Gage.
Yellow Egg.

PEARS.

Beurre Bosc.
Clapp's Favorite.
Duchess d'Angouleme.
Doyenne Boussock.
Howell.

Idaho.
Josephine de Malines.
Kieffer.
Lawrence.

Sheldon.
Superfin.
Souvenir du Congress.
Winter Nelis.

PEACHES.

Bowslaugh's Late.
Crosby.

Champion.
Elberta.

Hale's Early.

VISITS TO EXPERIMENTERS.

A visit was paid by the Secretary in the month of January, 1895, to Mr. A. W. Peart, Freeman, an applicant for the experiment station in that district.

In the month of May, Mr. Hutt and the Secretary visited Mr. Martin Burrill, President of the Louth Agricultural Society, who was an applicant for that district, and in July they visited Mr. E. B. Stevenson, strawberry specialist at Freeman, and Mr. S. Spillett, gooseberry specialist, Nantyr, who were applicants for experimental work with these fruits respectively.

In the month of August a visit was made by Prof. Hutt and the Secretary to the county of Bruce. The applicants seen and considered in that county were Mr. A. E. Sherrington, of Walkerton, and Mr. J. H. Wismer, of Port Elgin. Prof. Hutt then visited Mr. John Mitchell, our experimenter in the Beaver Valley, and Mr. G. O. Caston, our experimenter at Craighurst.

Early in September Prof. Hutt and the Secretary proceeded east of Toronto, visiting the following applicants for experimental work: Mr. J. L. Huggard, Whitby; Mr. E. C. Beman, of Newcastle, and Mr. Harold Jones, of Maitland.

Later on Prof. Hutt completed the tour of visitation to the other stations in western Ontario, a detailed account of which he will present to you. He will also give you in detail our united recommendations with regard to the appointment of new stations.

EXHIBIT AT INDUSTRIAL EXHIBITION, TORONTO.

On the 9th of September your Secretary visited Toronto to superintend the experimental exhibit, which was quite large, covering over six hundred plates. He was present to answer inquiries during the Monday, Tuesday, Wednesday and the Friday of that week. He secured assistance in setting up the exhibit from Messrs. A. H. Pettit, of Grimsby; A. M. Smith, of St. Catharines, and W. H. Dempsey of Trenton.

The following is a report of the exhibit:

In accordance with the instructions of the Executive Committee at Guelph, August 27th, the Secretary corresponded with the experimenters concerning an exhibit of varieties of fruits from each station at the Industrial Fair, and, as a result, a very large and interesting exhibit was secured.

Our grape experiment station at Winona contributed 111 varieties of grapes, besides some choice apples and pears; the Bay of Quinte station contributed 150 varieties of apples and pears; the Georgian Bay station contributed forty-one varieties of apples, thirteen of pears, besides some plums and peaches; our southwestern station in Essex contributed twenty-six varieties of peaches, besides apples, grapes and pears; A. M. Smith, St. Catharines, contributed twelve varieties of peaches, seven of pears, and also secured for us from Mr. Seymour Parnell, of St. Catharines, sixteen varieties of Russian apples which had been secured through the agency of the Fruit Growers' Association some years ago. In addition to these, the Secretary contributed 150 varieties of fruits of various kinds.

A large display sign of cloth was printed containing the words "Exhibit of the Ontario Experimental Fruit Farms," and this was hung on the wall over the exhibit. Besides this the name of each station, giving also the name of experimenter and his specialty, was printed on large sheets and posted over each exhibit. The display covered nearly the whole of two sides of the fruit building.

Our exhibit attracted much attention from all visitors, many of whom were interested in knowing the varieties of fruits which succeed best in the various localities of Ontario. It was also of great interest to other exhibitors who naturally looked to the experimental collection to verify the correctness of their own nomenclature.

This suggests a very important work devolving on us, namely, the correction of misnomers which exist throughout our country. To do this, it will be necessary that our exhibit be carefully supervised and the names verified, comparing the varieties, if necessary, with reliable descriptions. In this instance so enormous was the task devolving upon the Secretary in placing and arranging six or eight hundred plates of fruit, that, even with the assistance of Messrs. A. M. Smith, W. H. Dempsey and A. H. Pettit during a portion of the time, it was impossible to give much time to the verifying of names of the less common varieties and the comparing of samples of the same variety as grown at our different stations which will be a most important part of our work in the future.

In order that our exhibit be as directly educational in its nature as possible, I would suggest that in 1896 we again make an exhibit and that we observe the following points as the result of our experience in 1895 :

1. That each experimenter show a complete collection of his specialty, but of other fruits only samples of varieties of exceptional merit or of special interest.
2. That each exhibit, as far as possible, be opened and set up by the experimenter showing it.
3. That each experimenter be paid for his exhibit at the rate of ten cents for each correctly named variety set up at the Fair under the direction of the Executive who will have power entirely to reject plates of inferior samples.
4. That each experimenter have his expenses paid to and from the Fair in order to set up his collection and label it correctly.
5. That the superintendence of the whole be in the hands of the Executive Committee, with power to engage assistance, if necessary, in keeping the exhibit in order, and in answering questions relating thereto.

Inquiries were constant from exhibitors concerning the identification of varieties, and also from intending planters concerning the best varieties to plant in their respective localities.

EXPERIMENTAL SHIPMENT OF APPLES.

The great importance to Canadian fruit growers of opening up new markets, more especially for our apples, has led us to consider the possibilities of shipping to Australia. Apples were shown at the World's Fair from New South Wales, and the same country ships apples to Great Britain in good condition. Surely, therefore, we can reach Sydney with Canadian apples.

The fact that autumn in Canada is spring in Australia, and that these markets are bare of apples in October, November and December, led us to make still farther enquiries concerning Australian markets, and in response your Secretary received the following information in a letter from Mr. J. S. Larke, the commercial representative of Canada, at Sydney, dated July 16th, 1895 :

SYDNEY, N. S. W., July 16, 1895.

"In regard to the shipment of fruit here, the result would be very problematical. They do not use apples in this country as we do in Canada, mainly because of the expense and on account of the cheapness of meat leading to a much larger use of it than with us. This is the apple season of this country, the fruit being brought from Tasmania. I yesterday bought a case of cooking apples, hard and green. These cases contain, nominally, forty pounds of apples, generally less. Yesterday the case I bought cost six shillings and sixpence delivered at the house, and these were brought from a wholesale house. This is nearly two dollars and a half per bushel. The market prices, I observe, are somewhat less than the above, but I have never succeeded in buying at the market prices, and presume that they are the prices paid by the wholesale dealer. These apples will soon be out of season, and apples shipped from Ontario in November would reach here when the market would be bare of Australasian fruit. They would, however, have to meet the competition from California. Last year nearly 3,000 cases were sold from that country. The prices realized would run from eleven to fifteen shillings per bushel. This price is too high for a large consumption. There

is at present a duty of one shilling per bushel, which will, perhaps, be removed upon the first of January next, although this is exceedingly doubtful. I cannot tell you what you would be able to lay down a car of apples from Grimsby to Sydney at. You will be able to ascertain from a C. P. R. agent, who would perhaps give you a low rate on a trial shipment. In competing with California you would be competing with apples with no overland freight of any extent to pay, but I think a shipment of such apples as the Northern Spy would bring a higher price than the California product. There is little doubt that they would stand the journey and reach here in good condition. I think, however, that I would ship them in cases containing a bushel each. Barrels are expensive for shipping by water, as six of them make a ton of forty cubic feet. I rather expect it would be difficult to get the Government to pay the expense of a shipment of this kind, as they do not appear to have too overflowing a treasury just now. My services will of course cost nothing.

"In addition to what I have stated there would be some charges for cartage, dock charges, handling, etc., but I think that if put up in bushel cases as before mentioned, I might estimate the expenses to be something like this: Duty, one shilling; handling, cartage, commission, etc., one shilling; freight, six shillings. If they can be sold at twelve shillings a bushel this would leave a very narrow margin; if they could bring fifteen shillings that would be very much better. If you could make arrangements for a portion of a cargo I think it would be better than for a whole carload. It would also be advisable, if the experiment is decided upon, that I should be advised as early as possible, to prevent a larger quantity of Californian apples being ordered than might otherwise be the case. As a quantity of apples are pretty sure to be sent to British Columbia, a few cases might be sent here, as the steamer would take, I think, 100 cases at a very little higher rate than 1,000."

This letter, having been considered at a special meeting of the Board of Control, it was decided that the matter was of sufficient importance to Canadian fruit growers to make the experiment on a small scale, so that if successful growers might afterwards undertake it in commercial way.

Your Secretary was instructed to endeavor to carry out the wishes of the Board in this matter, and in response to his enquiries a letter was received, dated August 28th, informing him that owing to the steamer Warimoo being disabled her sailing date in October would not be taken, and that therefore any shipments would have to be made in September or November. The company would carry one hundred cases or barrels from Toronto to Sydney at the rate of \$1.50 per 100 pounds. It was also stated that cold storage space for the apples could be supplied in the steamer if advised in advance. Another letter, dated September 30th, conveyed the information that the railway company could not afford to run a refrigerator car with so small a load as that proposed to be sent.

Correspondence was had with several leading growers, and with some difficulty a shipment of one hundred and fifteen cases extra selected apples was made up. Some growers refused to join, believing the result would only be a total loss of the fruit, even if the freight was guaranteed. One firm of growers and shippers, in declining to send a consignment, pointed out that several attempts had been made to ship apples across the equator, and that none had been successful. The C. P. R. steamers had carried apples to Hong Kong, but while the fruit arrived in apparently fair condition so far as appearance went, it was found to be dry and pithy, and with scarcely any flavor.

The following is the list of varieties shipped: Baldwins, Greenings, Spy, King, Fameuse, Cranberry Pippin; and all were carefully wrapped in tissue paper and packed firmly in apple cases holding between fifty and sixty pounds each.

This shipment left Hamilton on the 17th of October, your secretary paying the freight in advance, in response to a letter from the C. P. R. agent at Hamilton. It was found necessary by the railway company to have the cases strapped with iron at both ends, which added \$4.60 to the cost of transportation.

In accordance also with the instructions of the Board of Control, joint action with the Ontario Fruit Growers' Association was taken in order to facilitate an experimental shipment of tender fruits, such as pears, tomatoes, grapes, peaches, plums, etc., to Great Britain in the cold storage compartments which were promised by the Dominion on the Allan Line of steamers. A large number of shippers in the Niagara district contributed to this shipment, and a car was filled with the choicest products of the Niagara district. But owing to the unfortunate collapse of the cold storage on shipboard, the fruit arrived in a wasty condition, and therefore the experiment was a failure. Next year better results are expected.

The result of the shipment to Australia is very interesting to Canadian apple growers, because it proves the possibility of a most important outlet for our finest grade of Ontario apples in seasons of abundance. When bushel cases can be sold in Sydney as high as fifteen shillings each the price of a barrel of No. 1 apples in Liverpool, and with freight charges of only about four shillings per case, it evidently only needs proper cold storage compartments to make this market the best in the world for Canadian apples.

REPORT OF MR. J. S. LARKE.

Following is the report made by Mr. J. S. LARKE, Commercial Agent of the Government of Canada, at Sydney, N. S. W., and dated December 18th, 1895.

I deemed that the fullest information as well as monetary returns were the object of the experimental shipment of apples. In order to secure this I put them into the hands of F. A. Winter & Co. Mr. Winter is a Canadian from Preston, who has been in Australia for some years and is devoting himself to handling Canadian goods and knows something about Canadian apples. He accepted them at sixpence per case. The ordinary commission for selling is seven and a half per cent., but this is disposing of them quickly and would not secure the facts that were obtained by handling single cases, so as to get the knowledge of the relative value of each variety of apples. I can state that Mr. Winter did the work thoroughly. I met him in the markets before six o'clock in the morning, before the arrival of the fruit, and personally know he visited the proprietors of the leading fruit shops and hotels to get customers.

I had intended to use the shipment as an advertisement for Canada had they arrived all right, but owing to the uncertainty as to what their condition might be, I had to go cautiously and simply had notices of their coming inserted in the leading papers. I may say Mr. Winter's commission at sixpence per case would have been but little over half the regular commission had the fruit arrived in good condition, and returns about two shillings per day for the time he devoted to the work after deducting car, bus and ferry fares. His full report tells the story, but I may add a note or two.

Codling Moth. The apples were well selected, but I found one or two cases of codling moth. There is no inspection law in this city as yet, but there may be next year and there is in one or two of the other colonies now. As these apples should be eligible to be reshipped to the other colonies, great care would have to be exercised in this respect in future shipments.

Size. As Mr. Winter points out, the shipment should be a portion medium size, another the largest, say at the rate of two cases of the former to one of the latter.

Color. This is of the utmost importance, even more so than flavor. The fruit should be a bright red. The Greenings were mistaken for cooking apples and although they had retained their flavor better than the other varieties, they would not bring a top price. The Cranberry Pippin is the type that this shipment has proven to be suited to this market.

Wrapping. The apples should be wrapped, it prevents abrasion of the skin and thus decay of the fruit. Manilla is better than the tissue paper. Some dealers here use the grease and waterproof paper used for packing butter, a sample of which I enclose. It has the advantage of preventing a decayed apple from infecting sound fruit and when fruit is shipped on deck and liable to be sprayed with salt water would be useful, but it is expensive and more difficult to handle than manilla, which has in this shipment answered the purpose well. The best shippers here wrap the ends of the paper around the stem and form a little cushion which assists in preventing the bruising of the apple.

Cases. The consensus of opinion is in favor of ventilated cases, either by boring holes as indicated by Mr. Winter, or by having the tops and sides of two pieces which would not quite meet. It would have been well if a portion of the shipment had been sent in ventilated cases.

Shipment The fruit, evidently, was carefully handled by the C. P. R. The steamship also devoted special care by putting it in a insulated chamber, where the temperature would be fairly even and kept an electric fan at work ventilating it. It was the hot air of the tropics that was thus pumped in and the tight cases neutralized even this. Thus for two weeks the apples steamed in their boxes, and to such an extent that the odor and flavor of the boxes had thoroughly permeated the fruit and, as we all thought, ruined them. This went off upon exposure to the air for a time but the fruit had become dead and to a large extent insipid. The favorite place for carrying fruit here is on the upper deck where it is simply covered with an awning. For short voyages this does well but in a long voyage the fruit is more liable to bruising by the rolling of the ship and to loss in a storm. The Warrimoo and Miowera have plenty of insulated chambers and refrigerating apparatus, and I think the fruit can be successfully carried in these chambers with the temperature maintained a little above freezing point. In a few months, shipments of apples will be made from Tasmania to Vancouver. I propose to get the steamships to test different methods of carrying fruit and I will be able to report the result to you.

The Future. Granting that the apples can be brought here in first-class condition, of which there is not much doubt, I think that eight thousand cases of apples like the Cranberry Pippin, carefully selected, could be sold at from ten to fifteen shillings per case. They would have to be landed by the steamer reaching here in November. The weather then is cooler, the markets barest of fruit. Whether this will pay will depend on the price in Canada and the rate of freight obtainable at the time.

I must thank you for the case of Cranberries and case of Fameuse sent me. They suffered like the others, but the Fameuse came out better than I feared. I had been boasting to Australians of the apples I proposed to give them when they came out. Neither variety were in the condition I would like to have had them, nevertheless I secured a quantity for distribution that were just a little bit better than any other fruit in the market. I am sorry the result is not what we should like, but it is not for want of attention at this end. Between the arrival and the sailing of the steamer, I am pretty well rushed, but Mr. Winter made up for what I could not do.

I am writing this in a hurry to catch the steamer leaving to-day, but I shall be glad to hear from you upon it and give any information respecting this or future shipments I can.

I beg to enclose a sight draft on London for eleven pounds, six shillings, which is the net receipts of the apples less two and sixpence exchange and one penny stamp duty.

ACCOUNT SALES BY F. A. WINTER & Co.

No. 1.

SYDNEY, N. S. W., December 16, 1895.

J. S. LARKE, Esq., Sydney, N. S. W. :

Account Sales of Canadian Apples, on account of Messrs. Woolverton & Cline, Ontario, Canada.

Cash received—

Account, L. Woolverton.....	£15	4	0	
“ G. W. Cline.....	7	3	0	
				£22 7 0

Cash paid—

Duty, 113 cases @ 1s. per case	£5	13	0	
Commission, 113 cases @ 6d. per case	2	16	6	
Wharfage “ @ 1d. “		9	5	
Cartage “ @ 2s. 6d. per ton 3 tons		7	6	
3 men, 1 day, picking over apples.....		18	0	
1 man, part of day, picking and repacking		2	0	
Carting rubbish away		2	0	
Market dues.....		5	0	
Space for repacking		5	0	
				£10 18 5
				£11 8 7

F. A. WINTER.

In accordance with your request I will endeavor to report fully the result of my experience in connection with the apples forwarded by Mr. L. Woolverton, of Grimsby, and Mr. G. W. Cline, of Winona, Ontario, and also give them the benefit of any knowledge obtained by inquiries from those who have been in the habit of importing American apples *via* San Francisco.

As soon as you informed me in regard to the varieties and quantity of each that were to arrive, I made enquiries as to the prospects for disposing of them, and soon learned that there was a very strong prejudice against American apples on the ground that, although they might be ever so good looking outside, so many of them were rotten at the core and tasteless that, as one shopkeeper said, "If there were any other decent apples in the market I would never buy an American apple, for there is no satisfaction to anybody in selling them." The wholesale men had the same objection, and I heard of several who had lost large sums of money on apples sent to them by agents *via* San Francisco and of whole shipments being sold in stacks on the wharf at from sixpence to two shillings per case (bushel), and a shipment that arrived a month ago had not turned out very well. To each one I explained that as the climate of Ontario was much colder than that of California, the apples grown there were better in flavor and keeping qualities than those from San Francisco, just as the apples from Tasmania are superior to those grown here in New South Wales.

It appears that for some years there has been an average of three monthly shipments every year from San Francisco. The last for this season (1,000 cases) arrived two days before the Canadian apples and I went down to the wharf to see them and noticed that all the cases had about six $\frac{3}{4}$ -inch auger holes in each side for ventilation. On inquiry I found that this was the first shipment sent with ventilated cases, and it turned out better than previous ones. They had come out on the main deck instead of in the hold and had been stacked with laths between the cases.

The Warrimoo arrived on Tuesday evening about five o'clock, and I endeavored to see the apples at once but they were not landed until next morning. I opened two cases, and found the temperature among the apples very high, while many of them were completely decayed, those that were sound had a very decided pine pitch flavor, sufficient to destroy the natural flavor of the apple. No time was lost in passing entries and having them removed to the Fruit Exchange, where I had them picked over, beginning with the Cranberry Pippins, many of which had a parboiled appearance outside, even when quite sound at the core, and gave evidence of having suffered from intense heat, while many were completely gone. For fear that those that were sound would go shortly after exposure to the atmosphere, I sold seven cases at 9s. 6d. each and three at 10s. that evening. Finding next morning that with exposure the flavor improved, I put up the price, selling one case at 11s., another at 12s. and one at 15s., leaving two cases left, which I sold at 15s. on Friday, a price far above any other apple in the market. The sound Cranberry Pippins stood repacking and exposure well, and those who bought the first lots came back for more. The opinion was freely expressed that they were the finest looking apples ever seen here. I have since seen them sold retail for threepence each.

The Baldwins sent out by Mr. L. Woolverton were highly colored, well selected and graded, and I succeeded in selling them all for 10s., except one case of extra fine ones, for which I obtained 11s. I found a prejudice against Baldwins as having a tendency "to go sleepy" as they say here.

The single case of Kings were in very bad condition; there was not a dozen perfect apples in the case, so there was really no opportunity to test the market with them, as I had to put in a number of spotted ones and a few odd Cranberry Pippins to make up the part case sold for 4s.

Of the eight cases of Northern Spys sent out by Mr. Cline, only one and a half cases were in marketable condition when opened, and even they soon became spotted so that 10s. was all that could be obtained for the lot. Mr. Cline's Baldwins were inferior to Mr. Woolverton's in size and color, and were not so well graded, the colored tissue paper used was saturated and difficult to remove from the apples, and in some cases this colored them.

The Greenings are not well suited to this market, as there are at present cheap local apples for cooking purposes, and for dessert or table use the people prefer a highly colored apple like the Cranberry Pippin. The Greenings were difficult of sale and too ripe to keep long, so after disposing of two cases at 9s., one of which went to the Hotel Australia (of which Mr. Moore, late of Toronto, is manager), I was obliged to clear them out on Saturday at 6s., as they were getting soft and mealy.

The apples were stored in an insulated chamber between decks, near the stern of the Warrimoo, which, judged by the apples when unpacked, must have become very heated. The almost airtight cases in which they were packed prevented ventilation among the apples, and when once they started to decay generated considerable heat.

In conversation with the chief officer of the Mariposa, who has been carrying apples for years from San Francisco, he said that on that ship the best places to stow apples were either on deck or at the bottom of the hold near the bow, below water level, the coldest part of the ship. The ventilation of the cases and circulation of the air he looked upon as an important matter.

Apples sent from here and Tasmania to England are usually placed in cool storage with an even temperature all the way and stand the trip across the line and through the Red Sea very well when carefully packed. I do not see why similar arrangements could not be made for bringing them from Vancouver here.

The best time for a shipment of Canadian apples to arrive would be the first half of November or earlier, were it possible, just before the stone fruit comes in or any local apples are ready to sell. It will be seen from the enclosed clippings from the Sydney *Herald* of December 13th and 14th, that there is quite a variety of fruit on the market now, including local apples at from 3s. to 7s. per gin case (five pecks).

In conversation with several wholesale fruit dealers to-day, they told me that if apples like the Cranberry Pippin were landed here in fair condition in quantities to meet the demand, there would be no doubt of their supplanting the San Francisco apples altogether. The freight from San Francisco is about 3s. 6d. per case, or very nearly as much as from Grimsby to Sydney, and the long rail journey did not appear to affect carefully packed apples in the least. In boring holes in the sides of cases to ventilate

them, care should be taken to have them come, as far as possible, between the rows of apples, so that the edge of the hole will not chafe the apples, and special instructions should be given at all points of reshipping to see that the top of the case is kept uppermost. †

Apples as carefully selected, graded and packed as those sent by Mr. Woolverton, with anything like fair treatment on board ship, would, I think, arrive in good condition, particularly if the cases were ventilated and cleats nailed on the top and side of cases to prevent them being stowed too close together. The Canadian cases are somewhat larger than those sent with apples from San Francisco. The relative dimensions are as follows: Canadian case, inside measurement, $11\frac{3}{4} \times 11 \times 21$; American cases vary in width from $9\frac{1}{2}$ to 10 5-6 ins. with a depth of 12 and length of $20\frac{1}{4}$ inside measurements. However, I would recommend keeping to the size case used for this shipment, as it allows for the packing at the bottom of the case.

Nearly 6,000 cases of apples have arrived this season from San Francisco, about 1,000 in October, 2,995 in November and 1,000 in December. The quantity shipped has been falling off of late years, as local apples are being kept longer and brought in earlier than formerly.

In regard to size of apples shipped, there is a limited sale here in Sidney for very large apples, but well colored apples, evenly graded, of the size of the second grade of Cranberry Pippins, would meet with the readiest sale, as all eating apples are sold retail by the dozen, and only a few shops can afford to buy apples that go so few to a case.

Should any further information be desired, it will afford me pleasure at any time to answer inquiries and for my own satisfaction I should like to know as early as possible whether there is likely to be shipment next year. As a native of Ontario I have taken a deep interest in this experiment, and have gone to a lot of trouble, endeavoring in every way to create for Canadian apples a distinct place on the market as being different to the Californian apples, and should any more be sent out, will be pleased to do what I can to have them disposed of to the best advantage. It is to be regretted that the trial shipment has not paid those who were plucky enough to make the venture, and I trust that future shipments may more than compensate for all loss on this.

Yours faithfully,

F. A. WINTER.

P.S.—It should be noted that the prices quoted in the newspapers were the prices asked, not necessarily obtained, as at time of quoting none of Mr. Cline's apples had been sold.

F. A. W.

QUOTATIONS FROM SYDNEY "HERALD."

December 13th, 1895.

S. M. "HERALD" FRUIT MARKETS.

The market was heavily supplied with all kinds of summer fruits, especially apricots, plums and peaches. Cherries were also in abundance. The demand generally was slow, and prices all round ruled easier. The jam companies continue to operate freely, being purchasers of large quantities of apricots and plums. Strawberries ruled decidedly easier. A cable published in the *Herald* about a month ago, stated that a trial shipment of apples had left Canada to test the Sydney market. The shipment consisted of 115 cases, and arrived yesterday at ex-Warrimoo (s.). They were forwarded to Sydney on account of Mr. Woolverton, who is the Secretary for the Fruit Growers' Association of Grimsby, Ontario, Canada. The names of the different kinds of apples were Cranberry Pippins, Greening, Baldwins, Kings, and Northern Spy. The apples were, generally speaking, of a large size, and well colored. They were grown at Grimsby, and had to be carried three thousand miles by rail before being shipped at Vancouver. The Cranberry Pippins arrived in good order, and realized 15s. per case. The other kinds were more or less damaged, and it is doubtful whether they will pay expenses. The market at present is not a very good one for apples on account of the large quantities of local fruit offering.

Current quotations are:

Lemons.—Prime, 11s., to 13s.; choice, 14s. per gin-case.

Apples.—Small, 3s. to 3s. 6d.; good, 5s. to 6s.; Nelsons. choice, 7s. per gin-case.

Canadian Apples.—Cranberry Pippins, 15s.; Greening, 10s. to 12s.; Baldwin, 10s. to 11s., and Northern Spy, 10s. per case.

December 14th, 1895.

The markets were heavily supplied to-day with all kinds of seasonable fruits. The demand was much brisker than it has been for some time. Peaches were not very plentiful, and consequently prices ruled firmer. There was an improved demand for Melbourne cherries, which realized higher prices. The local article sold much better at late current rates. Lemons were in good request at a slight reduction in price. Japanese and black plums commanded a fair amount of attention at slightly improved prices. Apricots were not in such heavy supply, and the quality, generally speaking, was much better, as also were prices. There was no sale for gooseberries. Bananas met with good demand, but prices still remain at a low ebb, owing to the large quantity of other fruits offering. Watermelons were on the market, and found fairly good sale at 9s. to 10s. per dozen, and passion fruit ruled a shade easier. Mr. F. A. Winter, who was the agent for the Canadian apples, which were on the market yesterday, stated to-day that the shipment will prove a loss to the senders, owing to the bulk arriving in bad order. The Cranberry Pippin was the only apple that carried well; the bulk of this class arrived in splendid condition, and, being a beautifully colored apple, is eminently suited for this market, as the agent stated that they have already been sold.

FINANCIAL STATEMENT.

Our finances are entirely under the control of the Department of Agriculture. Accounts are sent to me, and certified correct; then, if approved by the Provincial Auditor, they are paid by cheque from the Treasury Department. I have, however, kept a careful memorandum of payments, and here present it for your consideration.

Receipts.

Government grant.....\$2,000 00

Expenditures.

Allowance to experimenters	\$725 60
Stock	337 25
Salary of secretary.....	200 00
Travelling expenses of official visitors to stations and proposed stations.....	150 42
Fruit exhibit at Industrial Fair.....	70 70
Freight and duty	68 84
Camera and supplies.....	66 82
Board meetings	63 25
Books for experimenters	55 10
Experimental shipment to Liverpool	35 33
Experimental shipment to Australia.....	105 94
Postage	21 85
Nozzles for spraying	14 00
Printing and stationery	12 50
Committees	6 50.
Small items	2 00
Balance (not drawn)	63 90
	\$2,000 00

FUTURE PLANS.

Among the new features of our work for the year 1896, I may mention that of putting up samples in preservative liquids for exhibition at the Industrial, and afterwards for forwarding to the Ontario exhibit at the Imperial Institute, in London, England. The small fruits of the early summer, such as strawberries, cherries, gooseberries, etc., cannot be shown at the Industrial in any other way, and it is the wish of the Department that fresh samples be forwarded to the Imperial Institute.

In order to accomplish the best results in his work, the Secretary needs first a microscope for closer examination of fungi and insects sent in by experimenters. This need not cost over twenty-five or thirty dollars. And second, a camera, for taking photographs of fruits. One costing about forty dollars would do this work. This is one of our most important undertakings, namely, the preparing of photogravures of the fruits grown by our experimenters, which shall show our fruits as they really are, without the least exaggeration.

THE REPORTS FROM THE STATIONS.

The work of describing varieties is being pretty well attended to by all our experimenters, and indeed it is about the only thing we can do at first, viz., to describe all old varieties already well tested; but the most important part of our report in the future will be the yearly experiments with different fruits which are to be embodied in the STATION RECORDS. The attention of all our experimenters must therefore be especially called to the blank forms provided to show the results of these yearly experiments.

APPLES—DESCRIPTIVE LIST OF VARIETIES.

TESTED AT BAY OF QUINTE EXPERIMENT STATION: W. H. DEMPSEY, TRENTON, EXPERIMENTER.

Habit: S, Spreading; U, Upright; D, Drooping. *Cavity*: S, Shallow; N, Narrow; D, Deep; B, Broad. *Stem*: Length; tenacity to tree.
Size: S, Small, less than 1½ inches in diameter; M, Medium, 1½ to 3¼ inches in diameter; L, Large, over 3¼ inches in diameter.

Number.	Variety.	Origin.	Tree.		Size.	Form.	Fruit.
			Habit.	Age of bearing in years.			
1	Albury.....	Albury, Prince Edward.....	S	8	L	round, ovate.....	yellow.
2	Alexander.....	Russia.....	S	6	L	round, ovate, conical.....	greenish-yellow, russett dots, streaked with red, or splashed.
3	American Golden Russet.....	.....	US	8	M	ovate.....	golden yellow, covered with thin russet, numerous grey dots.
4	Benoni.....	Dedham, Mass.....	US	10	M	oblate, conical.....	rich yellow, blushed with red in sun.
5	Ben Davis.....	America.....	S	5	M L	roundish, ovate.....	yellow striped and splashed with red.
6	Baldwin.....	Massachusetts.....	S	10	L	roundish.....	yellow, shaded, splashed with crimson and red.
7	Beauty of Kent.....	England.....	S	8	L	roundish, ovate.....	yellow, tinged with green, shaded with red.
8	Bailey Sweet.....	New York State.....	S	6	L	roundish, conical.....	orange, shaded with red, russet dots.
9	Blenheim Pippin.....	Oxfordshire, England.....	US	10	L	round, oblate.....	orange-yellow, streaked and splashed with red, large russet dots.
10	Bonum.....	Squire Kennedy, Dandson Co., N.C.....	U	5	M	oblate.....	yellow, shaded with deep crimson strips and splashes of dark red, light dots, russet around basin.
11	Cabashea.....	.....	US	10	L	round, oblate.....	yellow, broken and splashed with dull red.
12	Canada Baldwin.....	Quebec.....	S	8	M	ovate.....	yellow, broken strips and splashes of red, numerous russet dots.
13	Duchess.....	Russia.....	S	5	L	round, oblate.....	yellow, splashed with light red in sun.
14	Fallowater.....	Pennsylvania.....	S	10	L	round, ovate.....	greenish yellow, shaded with a dull red and few large whitish dots.
15	Fall Queen (Haas).....	Kentucky.....	US	6	M	oblate, conical.....	yellow, striped with crimson, covered with white dots.
16	Famense.....	Canada.....	S	6	M	round, oblate.....	yellow, tinged with pale red and dark cheek, in sun.
17	Grand Sultan.....	Russia.....	U	6	L	ovate.....	whitish yellow, striped and splashed with red in sun.
18	Hawthornden (old).....	Edinburgh, Scotland.....	S	6	M	round, ovate.....	yellow.
19	Hawthornden (new).....	".....	S	6	L	round, ovate.....	yellow, with a crimson blush in sun.
20	Hurlbut.....	Connecticut.....	S	8	L	round, oblate.....	yellow, striped and splashed with red in sun, numerous whitish yellow, shaded, and obscurely striped with light red, small light dots.
21	Horn.....	.....	U	7	M	oblate.....	waxen white, shaded with bright red or crimson in sun, with a few grey dots.
22	Highland Beauty.....	Wm. Roe, Newbury, N. Y.....	US	6	S	oblate, somewhat angular.	

APPLES.—Continued.

TESTED AT BAY OF QUINTE EXPERIMENT STATION.

		Fruit.						
Number.	Cavity.	Stem.	Basin.	Calyx.	Weight.	Flesh.		
						Color.	Texture.	Flavor.
1	D	2 inch	broad	partly open	.....	white	buttery	sub-acid.
2	D	1 inch	deep, even	large, open	.....	yellowish white	crisp	sub-acid.
3	N	1 1/4 inch	narrow	closed	4 oz.	yellowish	fine grained	mild, rich, sub-acid.
4	D	1 inch	small	erect, partly closed	.....	yellow	tender	rich, sub-acid.
5	D	1 1/2 inches	deep	erect, partly closed	.....	white	tender	mild, sub-acid.
6	B	3/4 inch, heavy	deep, plaited	closed	.....	yellowish white	tender	sub-acid.
7	D	3/4 inch	narrow	small, closed	.....	greenish white	tender	sub-acid.
8	N	1 1/2 inch	narrow	closed	.....	yellowish white	tender	sweet.
9	B	1 1/2 inch	broad	open	.....	yellow	breaking	sub-acid.
10	N	1/2-1 inch	shallow, slightly corrugated.	partly closed	3 oz.	white often	firm	rich, mild, sub-acid.
11	N	1 inch	broad	open	.....	whitish yellow	crisp	sub-acid.
12	N	1 1/2 inch	broad	closed	.....	whitish yellow	crisp	mild, sub-acid.
13	D	1 inch	deep	partly closed	.....	white	crisp	sub-acid.
14	N	1 1/2 inch	small	open	.....	greenish white	crisp	mild, sub-acid.
15	D	1 1/2 inch, slender	large	half open	.....	yellowish white	tender	acid.
16	D	1 1/2 inch	shallow	small, half open	.....	white	tender, juicy	sub-acid.
17	D	1 inch	wrinkled	open	.....	white	buttery	acid.
18	B	1 inch	wide	open	.....	white	crisp	acid.
19	D	1 inch	broad	half open	.....	white	crisp	sub-acid.
20	D	1 inch	broad, plaited	closed	.....	white	breaking	mild-sub-acid.
21	D	1 inch	shallow, corrugated	closed	3 oz.	yellowish white	tender	mild, sub-acid.
22	D	1 1/2 inch	deep, corrugated	closed	3 1/2 oz.	white	fine, crisp	mild sub-acid.

APPLES.—Continued.
TESTED AT BAY OF QUINTE EXPERIMENT STATION.

Number.	Variety.	Origin.	Tree.		Size.	Form.	Fruit.
			Habit.	Age of bearing in years.			
23	Hastings	Mr. Phillip Rich, Kingston, N. Y.	U	8	M	ovate	Color of skin. yellow, striped with bright red and very dark in sun. yellow, covered by lovely red stripes, and dark red in sun.
24	Jonathan		S	6	S	roundish, conical	
25	Lord Suffield	England	S	8	M	conical, ovate	small russet dots. pale, greenish yellow, slightly tinged with red in sun. yellow, nearly covered with red and darker in the sun. golden yellow on shaded side, and dark red, changing to deep, clear, shining crimson on side next sun, dotted with russet specks.
26	La Rue	Ontario	U	10	L	oblong	
27	Lord Burghly	England, raised in the garden of Marquis of Exeter at Burghley, near Stamford; distributed by Mr. House, nurseryman, at Peterboro, 1865.	U	8	M	round, ovate, angular.	
28	Lady	Old French variety	U	7	S	oblate	lively lemon yellow with brilliant deep red cheek. yellow, covered with light red and very dark red in the sun with numerous white dots.
29	Mountain Beet	Canadian	U	6	M	oblong	
30	Mountain Tulip	Canadian	S	7	M	conical	yellow, striped with deep red, and nearly covered on one side with russet.
31	Margl	France	D	5	S	ovate	
32	Mother	Massachusetts	U	7	M	oblong, ovate, ribbed	yellow, covered with a rich red, a deep red in sun. yellow, striped and splashed with red in sun.
33	Northern Spy	New York State	U	14	L	roundish, conical	
34	Northfield Beauty	Leonard D. Cady, Northfield, Vermont, from seed of Siberian Crab.	U	8	M	roundish, oblate	whitish, shaded with light red, striped and splashed with two shades of rich red, a few light dots.
35	Ontario	Charles Arnold, Paris, Ont., (Spy and Wagener)	U	5	L	oblate	yellow, splashed and sprinkled with red or crimson in sun, covered with a rich bloom.
36	Pomme Gris	Canadian	US	9	M	oblate, roundish	greenish grey or cinnamon russet, some red on side next sun.
37	Kawles Janet	Caleb Rawlis' farm, Amherst Co., Va.	S	6	M	oblate	greenish yellow, shaded and striped with red.
38	Reinette Verte	France	US	7	M	round, ovate	yellowish green, streaked and striped with red, covered with fine grey dots.
39	Vermont Sweet	Vermont	US	7	M	round, ovate	yellowish white.

APPLES — *Concluded.*

TESTED AT BAY OF QUINTE EXPERIMENT STATION.

Fruit.

Number.	Cavity.	Stem.	Basin.	Calyx.	Weight.	Flesh.		
						Color.	Texture.	Flavor.
23	D	1 "	deep	closed	4 oz.	white	tender	mild, sub-acid.
24	D	1 "	deep, broad	closed	2½ oz.	white	tender, juicy	mild, sprightly, vinous.
25	D	1 "	broad, plaited	small, closed		white	tender	sub-acid.
26	B	1 "	plaited	open	5½ oz.	yellowish white	coarse	sub-acid.
27	B	1 "	angular and plaited	partly closed	3½ oz.	yellowish	very tender	pleasant, sub-acid.
28	D	1 "	round, plaited	closed	1¼ oz.	white	crisp, tender	pleasant, sub-acid.
29	D	1-1 "	broad, wrinkled	closed	3 oz.	white with splashes of red.	tender	sub-acid.
30	D	1 "	narrow, ribbed	closed	3 oz.	white	tender	mild, sub-acid.
31	D	1 "	angular	closed		yellow	breaking	spicy, mild, sub-acid.
32	S	1 "	small, plaited	closed		yellow	breaking	spicy, mild, sub-acid.
33	D	1 "	deep	partly closed		yellowish white	breaking	rich, sub-acid.
34	B	1-1 "	small, corrugated	closed	3 oz.	white	fine, tender	sprightly, sub-acid.
35	D	1 "	deep, even	closed		white	breaking	sub-acid.
36	B	1-1 "	shallow, narrow	partly closed	2 oz.	yellowish	crisp, very	juicy, aromatic, sprightly, sub-acid.
37	S	1 "	shallow	partly closed	2 oz.	whitish yellow	tender, juicy	pleasant, sub-acid.
38	D	1-1¼ inches	deep, plaited	closed	4 oz.	yellowish white	tender, juicy	aromatic.
39	D	1 inch	narrow, plaited	closed	3½ oz.	white	tender, juicy	pleasant, sweet.

BAY OF QUINTE STATION. CORRECTED RECORD OF EXPERIMENTS.

APPLES.

varieties.	Origin.	When planted.	Cultivation.	Fertilizers used.	Date of pruning.	Thinning—per cent. by hand or acct.	Time of blooming.	Date of gathering.	Yield.	Grade.			Storage.		Average price per bbl.	Remarks.		
										Class 1.	Class 2.	Class 3.	Place.	Temperature.				
1894.																		
*Albany.....	Albany, Ont.....	1888			March	bu.		Sept.....	1 bu.....	bu.	bu.	bu.			\$ c.			
*Alexander.....	Russian.....	1878			"			"	4 bu.....	3 1/2	1 1/2	1 1/2			2 00			
Benoni.....	Massachusetts.....	1880			"			"	4 1/2 bu.....	3 1/2	1 1/2	1 1/2			2 00			
Ben Davis.....	".....	1880			April.	1		Oct. 16.....	5 bbls.....	4	1	1	Fruit house.	28 to 36	3 00	1st April, 1895.		
Baldwin.....	".....	1874			"			" 16.....	3 bbls.....	2 1/2	1 1/2	1 1/2	"	28 to 36	3 00	"		
Duchess.....	Russia.....	1880			March	1 1/2		{ Aug. 18-25 } Sept. 1.....	3 bbls.....	3	1	1			1 75	"		
Fallowater.....	".....	1878			"	2 1/2		Oct.....	1 bu.....	3	1	1	Fruit house.	28 to 36	2 75	"		
Fameuse.....	Canada.....	1880			April.	1		" 8.....	5 1/2 bbls.....	5	3	1			2 50	"		
Northern Spy.....	".....	1880			"			" 9.....	4 bbls.....	3	1	1	Fruit house.	28 to 36	3 00	"		
+Ontario.....	Chas. Arnold, Paris, Ont., Spy X Wagener.	1890			"			" 9.....	1 bbl.....	1			"	28 to 36	3 00	"		
1895.																		
Bailey Sweet.....	New York State.....	1880	Plowed and harrowed till 15th August.	Stable & ashes.	May 16	1		"	8 bu.....	5	2	1	"	28 to 30	2 00	One of the best sweet apples.		
Blenheim Pippin.....	Woodstock, Oxfordshire, England.	1893	"	"	" 16	1/2		" first week	4 bu.....	4			"	28 to 30	2 50			
Cabasha.....	England; raised in the garden of the Marquis of Exeter at Burghley, near Stamford, distributed in 1865 by Mr. House, nurseryman at Peterborough.	1870	In sod	None.	April.	3/4		" 15.....	3 bu.....	3			"	28 to 30	1 50	Dwarf tree imported.		
Lord Burghley.....	".....	1880	"	Ashes.	May 7			" 20.....	6 bu.....	5	1	1	Shipped		2 50			

La Rue	Ontario	1880	Plowed three times, harrowed till August.	Stable..	April.	1	"	20	"	15.....	4 bu....	3	$\frac{1}{2}$	$\frac{1}{2}$	"	.....	1 50
Mountain Beet ..	Canadian.....	1880	Plowed four times and dragged till August.	"	"	$\frac{1}{2}$	"	14	Sept	.....	9 bu....	5	2	2	"	....	1 25
Mountain Tulip	Canadian.....	1879	"	"	May.	$\frac{10}{5}$	"	14	Oct.	1.....	3 bu....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	"	.....	1 50
Rawles Janet ...	Caleb Rawles' farm, Amherst Co, Va.	1887??	"	"	April.	$\frac{10}{5}$	"	12	"	.....	6 bu....	3	2	1	Fruit house.	28 to 36	2 25
Reinette Verte...	France	1880	In sod.....	Ashes ..	June.	.....	"	16	"	20.....	6 bu....	5	1	.....	Shipped	.....	2 25
Vermont Sweet.	Vermont	1885	Plowed four times and dragged till August.	.....	May	.....	"	14	"	10.....	6 bu....	2	3	1	.....	.....	1 00

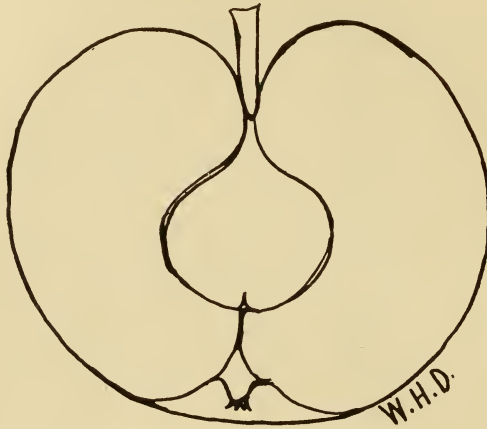
* Dwarf trees.

soil was a sandy loam, cultivated and fertilized with stable manure. The pruning was pyramidal. Apples were stored in cellar.

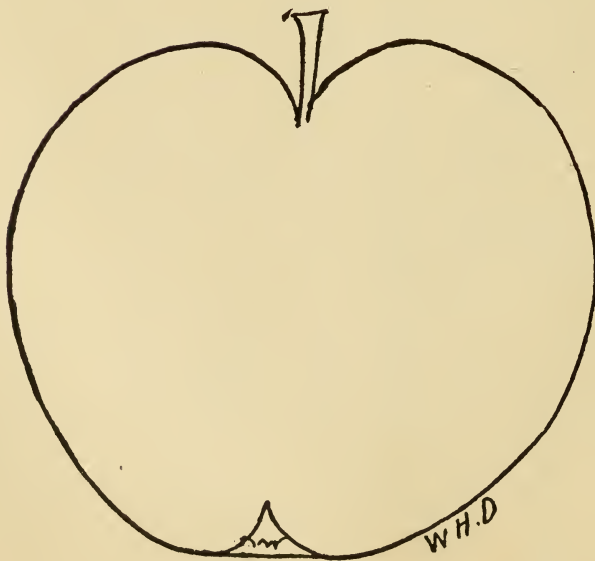
† Bailey Sweet, grafted to Ontario four years ago.

APPLES.

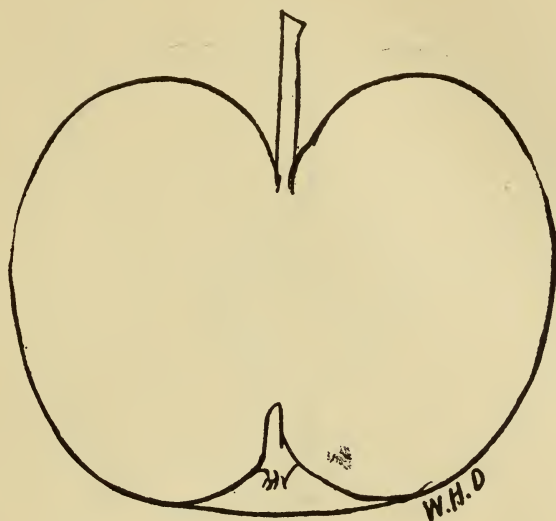
OUTLINES OF VARIETIES GROWN AT BAY OF QUINTE EXPERIMENT STATION.



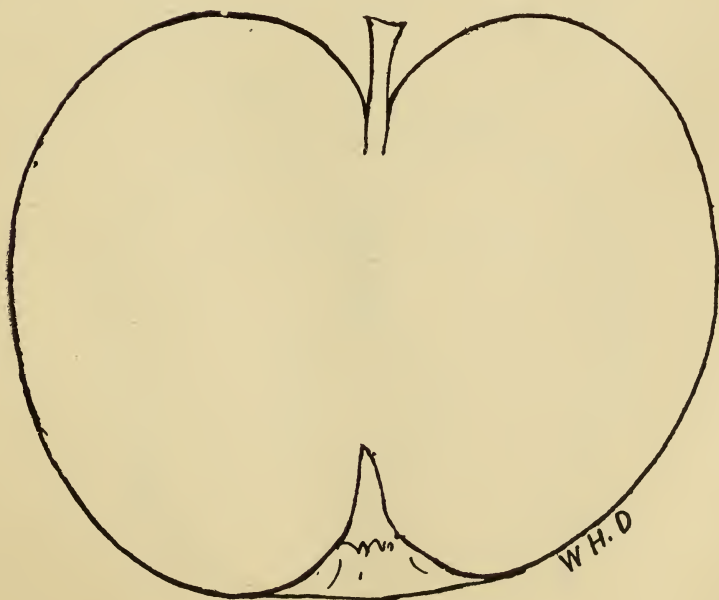
BONUM.



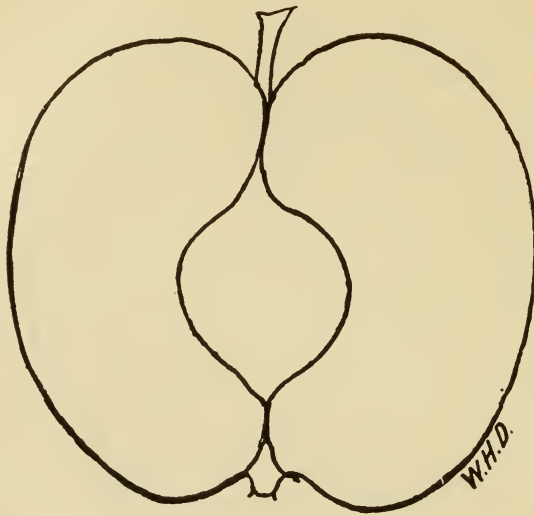
BAILEY SWERT.



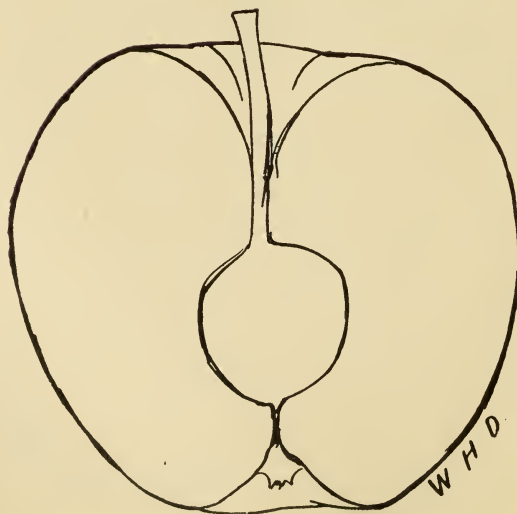
CANADA BALDWIN.



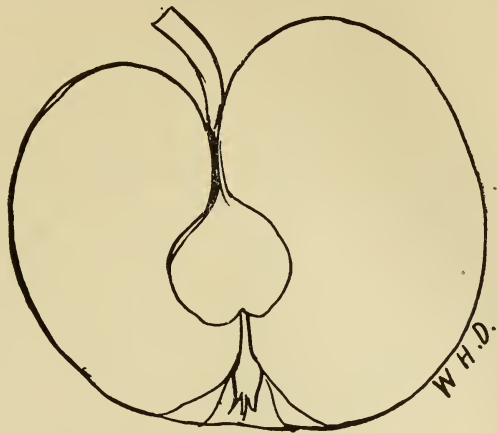
FALLAWATER.



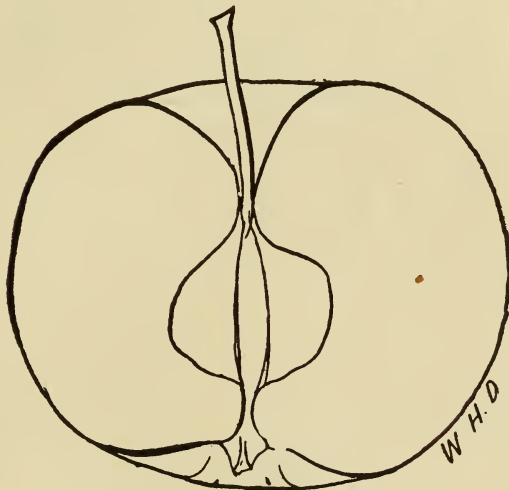
GOLDEN RUSSET.



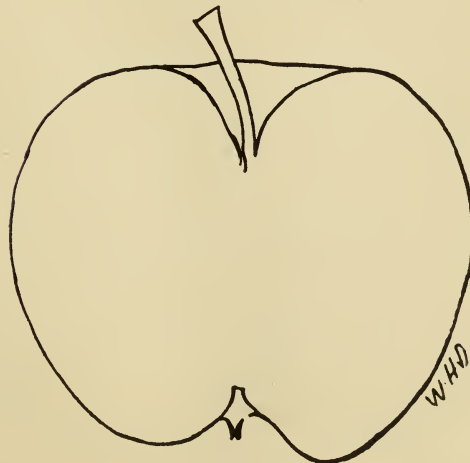
HASTINGS.



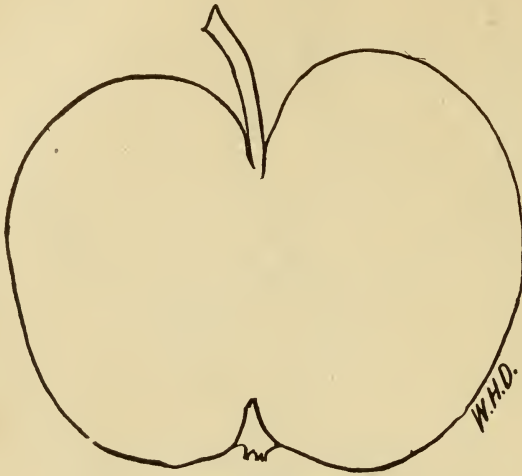
HIGHLAND BEAUTY.



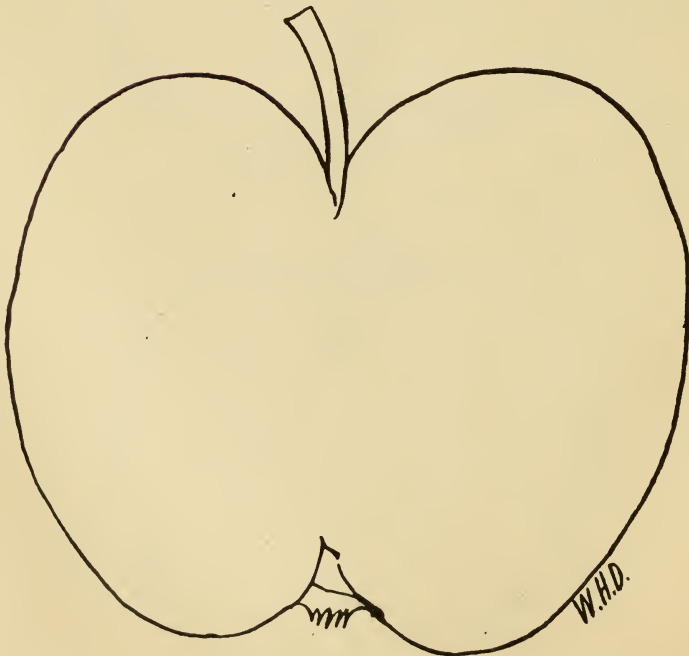
HORN.



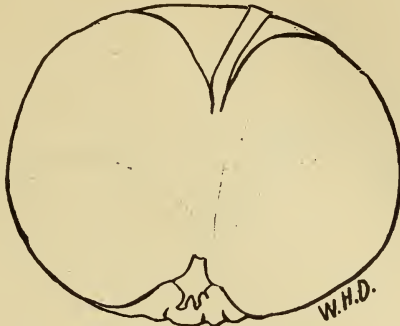
JONATHAN.



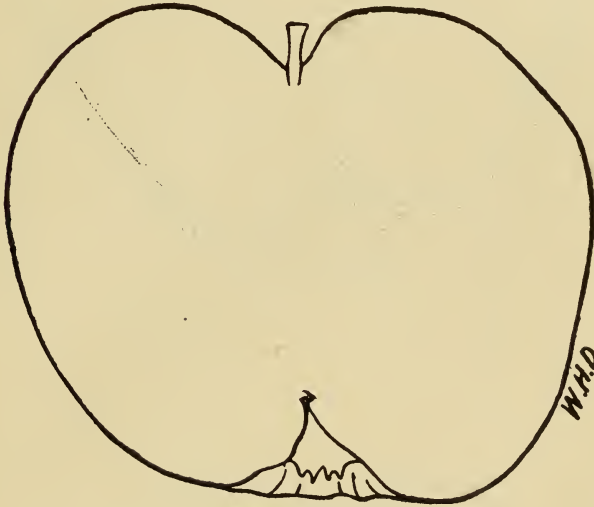
RAWLE'S JANET.



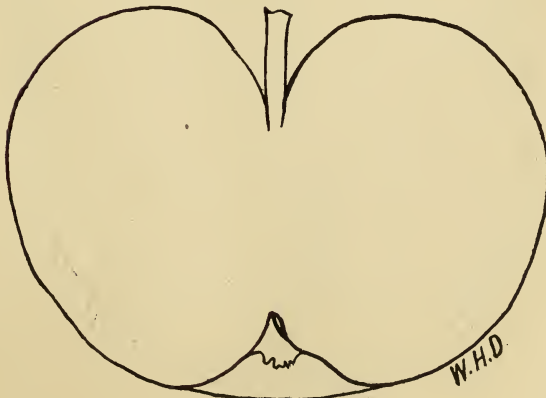
LA RUE.



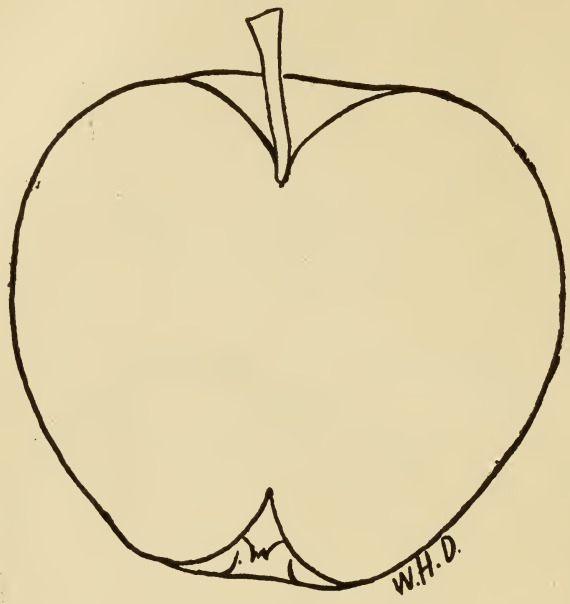
LADY.



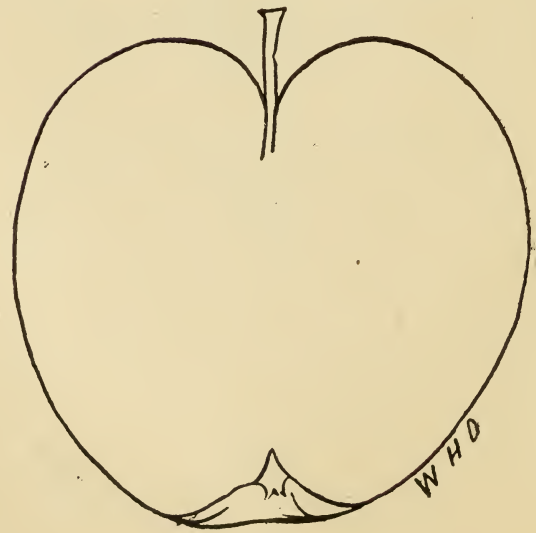
LORD BURGLEY.



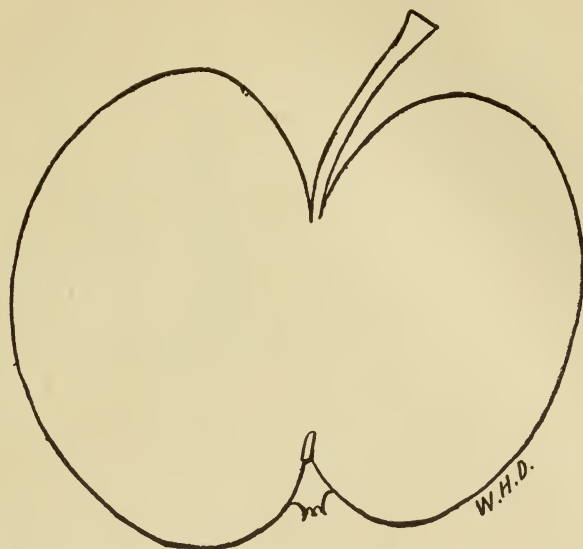
POMME GRISE



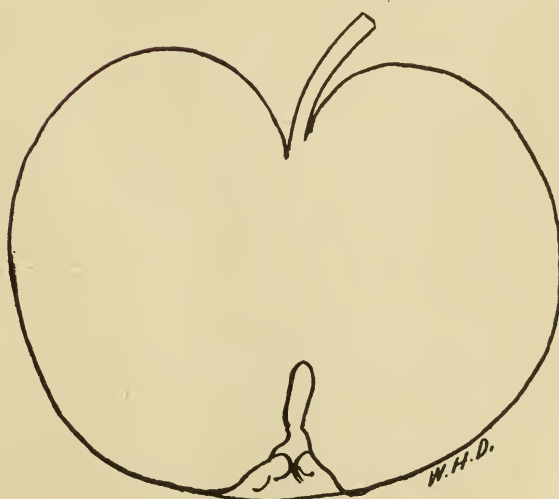
MOUNTAIN TULIP.



MOUNTAIN BEET.



REINETTE VERTE.



VERMONT SWEET.

APPLES.

DESCRIPTIVE LIST OF VARIETIES TESTED AT THE SIMCOE EXPERIMENT STATION : G. C. CASTON, CRAIGHURST, EXPERIMENTER

Habit : S, Spreading; U, Upright; D, Drooping.
Form : C, Conical; R C, Roundish Conical; R Obl, Roundish Oblate; R, Roundish.
Cavity : S, Shallow; N, Narrow; D, Deep; L, Large; Irreg, Irregular; W, Wide.

Size : S, Small, less than 1½ inches in diameter; M, Medium, 1½ to 3 inches in diameter; L, Large, over 3½ inches in diameter.

Number.	Varieties.	Origin.	Tree.		Size.	Form.	Fruit.
			Habit of growth.	Age of bearing in years.			
1	Alexander	Russia	U	7	L	conical	greenish-yellow, shaded with bright red.
2	Astracan, Red	Sweden to England	U	7	M	roundish conical	red.
3	Baxter, or La Rue	Mr. La Rue, near Brockville.	U	8	L	R C	red streaked.
4	Ben Davis	Missouri	U	7	M	C	yellowish, with two shades of red.
5	Cayuga Red Streak	Cayuga, N. Y., from Conn.	U	8	L	R obl C	red streaked.
6	Colvert	Russia	S	8	M	R obl	greenish-yellow, splashed with red.
7	Duchess	Duchess	S	6	M	R obl	yellow, streaked with red.
8	Fameuse	Canada	S	6	M	R obl	red.
9	Gideon	Russia	U	5	L	C	white, with red cheek.
10	Grine's Gold-n	Thos. Grimes, Virginia	U	7	M	C	red.
11	Haas	Gen. Hurlbut, Conn	S	8	M	flat	white, with red cheek.
12	Hurlbut	New Jersey	S	9	M	R obl	yellow when ripe.
13	Kirk	New Jersey	S	10	L	R	red.
14	Maiden's Blush	New York State	S	8	L	flat	lemon yellow, with bright crimson cheek.
15	Mann	Near Rochester, N. Y.	U	7	M	R obl	green, turning yellow, with light and gray dots.
16	Northern Spy	Pewaukee, Wis	U	13	M L	R obl C	red streaked.
17	Pewaukee	Yorkshire, Eng	U	6	M	C	red streaked.
18	R. I. Greening	Uncertain	S	10	M	R obl	green.
19	Ribston Pippin	St. Lawrence	U	7	M	R C	brownish russet, tinged with red.
20	St. Lawrence	Rhode Island	U	8	M L	obl C	streaked with red.
21	Talman Sweet	Russia	U	8	M	R	whitish yellow, sometimes with a bluish line from stem to calyx.
22	Tetovsky	Peter Gideon, St. Paul, Minn.	U	4	M	obl C	yellow, striped with red, slight bloom.
23	Wealthy	Fen Yan, N. Y.	S	3-4	M	R obl	whitish-yellow, shaded with deep crimson.
24	Wagner	Russia	U	8	M	R obl	yellow, nearly covered with crimson.
25	Yellow Transparent	Russia	S	4-5	L		yellow.

APPLES.

DESCRIPTIVE LIST OF VARIETIES TESTED AT THE SIMCOE EXPERIMENT STATION, ETC.—*Concluded.*

Number.	Fruit.					
	Cavity.	Basin.	Calyx.	Color.	Flesh.	
					Texture.	
					Flavor.	
1	D	deep	large	yellowish, white	a little soft, juicy	pleasant.
2		slight	partly closed	white	crisp, moderately juicy	spicy, acid.
3		wide, abrupt	partly open	white	firm	slightly acid.
4	N D	deep	small	whitish	firm	poor.
5	W D			greenish-white	coarse	sub-acid, poor.
6	S	wide, even	large, nearly closed	white	firm	brisk, sub-acid.
7		shallow, narrow	small	very white, sometimes streaked with red	firm, juicy	pleasant, acid when ripe.
8	N, fine shaped			white	tender, juicy	pleasant, slight perfume.
9				white	firm	pleasant.
10				yellow	crisp, tender, juicy	rich, sprightly, sub-acid, aromatic.
11		shallow		white, tinged with red	firm	poor.
12		medium, slightly corrugated	closed	white	crisp, tender, juicy	pleasant, mild, sub-acid.
13			small, closed	yellowish	juicy, tender	agreeable, rich, vinous, aromatic.
14	L irreg	gated	closed	white	tender	sprightly, pleasant, sub-acid.
15		large, slightly corrugated	closed	yellowish	firm	pleasant when ripe, very acid.
16	D	narrow, furrowed	small, closed	white	fine-grained, tender	sprightly, sub-acid, sub-acid.
17	W D		small, closed	white	fine-grained, tender, crisp, juicy	pleasant when ripe.
18				yellow	firm	pleasant aroma, rich.
19	W	angular	small, closed	white	firm	one of the best, fine flavor.
20	L	small, deep	firmly closed	white	crisp, juicy, tender	pleasant, rich.
21	W S	small, depressed		white	firm, fine-grained	sweet and rich.
22				white	juicy, soft	pleasant, sub-acid.
23		deep, abrupt, uneven	partly closed	white, stained with red	fine-grained, tender, juicy	pleasant, slightly acid, crisp.
24	L B irreg	abrupt, corrugated	small, closed	yellowish	tender, juicy, brisk	excellent.
25				white	firm	fair.

NOTES ON VARIETIES OF APPLES IN 1895.

I have planted this year for experimental purposes twenty-eight varieties of apples, including ten varieties of crabs. The apples were of the following varieties:—Gano, Gideon, Sweet Bough, Salome, Sherwood's Favorite, Shackleford, Wolf River, Tetofsky, Red Canada, Primate, Hastings, Peerless. The latter from Minnesota, said to be a seedling of the Duchess. I received from Iowa, Sweet Longfield, Regel, Good Peasant, Vargul, Lubsk Queen and Anisim. These were duplicates, as I had these varieties already. Of the twenty-eight varieties of apples tried ten were crabs of the following varieties:—Hyslop, Martha, Minnesota Winter, Orion, Pietta Stricta, Paul's Imperial, Quaker Beauty, Telfer Sweet, Van Wyck, Whitney. Of apple scions for grafting I received the following:—Gravenstein, Bethel, Parsons Sweet, Utters Red, Magog Red Streak, Nodhead, Newton Pippin, Coles' Orange Pippin, Jonathan, Starr, Banks' Red Gravenstein, also two seedling apples from Muskoka, viz., McMillan and Sally Brown.

Of the varieties of apples under test I have little to add to the report of last year, as none of the new varieties have fruited, except the Yellow Transparent. One tree of this variety one year planted bore three apples. As it was described in the report of last year it will be unnecessary to repeat it. But I think it well just here to give a few notes on a few varieties of HARDY APPLES grown in this section that seem to do well and that are valuable for home and foreign market.

The Wealthy.—This apple cannot be classed as a winter apple even in this northern section. It is undoubtedly a fall apple, and requires to be picked, packed, and marketed in September. But to anyone who can secure a market for it at home or abroad at that time of year there is no apple that I know of that will give as good a profit as the Wealthy. It seems to find a congenial climate here, and attains to great perfection all through this section of country. It is the fall apple *par excellence* of Simcoe county. Its good points are fine quality, bright handsome color (their appearance either in baskets or barrels is simply superb), early bearing, regular bearing, and their ability to bear large crops of a uniform size and quality. Its faults are chiefly two. First, the form of growth of the tree renders it liable to split when loaded; and second, the premature dropping of the fruit. The first may be remedied by the proper training of the tree while young, and the second by picking the fruit just as soon as it attains full size and color.

The Pewaukee.—This apple does well and will keep nearly as long as the Spy, but has a very bad fault. The fruit is liable to drop during windy weather before attaining full size or maturity.

The Mann.—This is quite a popular variety here, seems hardy enough for this section, bears well, and is considered by many equal if not superior to the R. I. Greening.

Bottle Greening.—Popular in the Collingwood district, and does well all through this county. One of the most valuable of the green apples for export.

Fallowater.—This is likely to prove one of the most valuable of the winter varieties for this section. It does remarkably well all through the county and attains great size and beauty wherever it receives good care and cultivation. It is going to be one of the most valuable varieties for export. It has been quoted at 18s. 6d. per barrel in Liverpool this fall. The tree is healthy and vigorous and seems quite hardy here. It is thus described by Downing: Fruit very large, globular, inclining to conic; skin, yellowish green, shaded with dull red and sprinkled with large grey dots; stalk very short, inserted in a deep cavity; calyx small and closed, set in a slightly plaited basin; flesh greenish white, juicy, crisp, rather tender, pleasant subacid flavor, good November to February. In this section it keeps well till April. Downing also describes the tree as a strong grower and very productive.

I might name the following as a valuable selection for orchard planting for this section:—Summer, Duchess; fall, Wealthy, Alexander; winter, Fallowater, Mann, Bottle Greening, Spy, King, Baldwin, the last three to be top grafted on Tolman Sweets or other

hardy stock. Of the older varieties that are still in demand for dessert apples I might mention Fameuse and St. Lawrence, and in their season these are hardly excelled by any others for that purpose.

SPRAYING.

I have made during the spring and summer a thorough test of the effects of spraying with Bordeaux mixture for the apple scab, and with Paris green for the codling moth. The first spraying on the bare trees was done with a mixture of two pounds copper sulphate to forty gallons water. After the blossoms fell the Bordeaux mixture was used, four pounds copper sulphate to forty gallons water, and four ounces Paris green to forty gallons. The lime was put in by the cyanide of potassium test, and to make sure a third more lime was added after the test showed enough. The mixture was kept thoroughly agitated and put on with a Vermorel or a McGowan nozzle, using each alternately. The spraying was done in a most thorough manner. The leaves were covered with the mixture most of the summer, there being little or no rain during the spraying season or several weeks after the last spraying. One tree in a row of each variety was left unsprayed for purposes of comparison.

RESULTS.

The apples in my orchard being almost an entire failure owing to the May frost, I cannot give any tabulated statements as to per cent. of fruit and second quality. The fruit, what little there was, was certainly cleaner and slightly larger on the sprayed trees. This was more apparent on the Spy, La Rue, Wealthy and Astrachan. A difference was also noticeable on the foliage, and late in the fall the leaves were all off the unsprayed trees while yet green and bright on the sprayed ones. One thing occurred however that showed that some varieties of apple trees are more liable to injury from repeated application of the Bordeaux mixture than others. The Golden Russet and La Rue lost about three-fourths of their foliage about midsummer. These trees presented a pitiful sight about this time with most of their leaves yellow and falling off, while other varieties alongside in the same rows were not affected at all. However, it did not seem to affect the fruit at all, and after the discolored leaves had fallen the trees seemed to regain their normal color and appearance. I attribute this effect to the long spell of dry weather and the leaves being constantly covered with Bordeaux their pores became clogged and smothered. But why some varieties should be affected in this way while others under precisely the same treatment should not show any damage, I cannot at present account for.

CONCLUSIONS.

While not wishing to say anything to underrate the value of spraying, especially for the prevention of the damage from codling moth and other insect enemies, yet I believe that as regards the apple scab, an orchard planted on rolling ground, with the trees well pruned and planted far apart to insure a free circulation of air and plenty of sunshine, will have much cleaner fruit than an orchard on low, flat ground, with the trees too close together and pruning neglected till the trees are a mass of brush, keeping out the sunshine and preventing a free circulation of air, no matter how thoroughly and well the latter may be sprayed.

That some varieties of apples are much more susceptible to injury from Bordeaux mixture than others, and finally that more than one season's experiments are required before definite results and conclusions can be reached as the effects of the year's work, may be more apparent next year than this.

G. E. CASTON,
Experimenter.

PEARS.

DESCRIPTIVE LIST OF VARIETIES TESTED AT BAY OF QUINTE EXPERIMENT STATION: W. H. DEMPSEY EXPERIMENTER.

Habit: U, Upright.
S, Spreading.
D, Drooping.

Form: Obt., Obtuse.
Obl., Oblong.
Ob., Obovate.
Py., Pyriform.
Ob., Oblate.

Cavity: S, Shallow.
N, Narrow.
D, Deep.
B, Broad.

Size: S, Small.
M, Medium.
L, Large.

Number.	Varieties.	Origin.	Tree.		Size.	Form.	Fruit.	
			Habit of growth.	Age of bearing in years.			Color of skin.	
1	Annaas d' Ete.....	Holland	U	10	M	obovate pyriform.....	yellowish green with a brownish tinge on side next sun.	
2	Bartlett	England	U	6	M	oblong, obtuse pyri.	clear yellow, sometimes a little bluish in sun.	
3	Belle Lucrative.....	Belgium	U	8	M	conic obovate	lemon yellow, sometimes green.	
4	Beurre Clairgeau.....	Nantes, Mr. Clairgeau	U	10	M	obovate pyriform..	yellow, or yellowish brown.	
5	Beurre d'Anjou.....	France	S	10	M	obovate pyriform ..	greenish yellow, with a brown cheek next the sun, covered with small russet dots.	
6	Beurre Gris d' Hiver.....	France	U	10	M	obovate	greenish russet.	
7	Beurre Hardy	Rhode Island	U	6	M	obovate, obtuse py.	yellow, covered with thin brown russet.	
8	Buffum	Belgium	U	8	M	oblong obovate	yellow, with a brown cheek.	
9	Boussock	Belgium	US	8	M	obovate	lemon yellow, sprinkled with russet dots.	
10	Clapp's Favorite	Thaddeus Clapp, Dorchester, Mass	US	6	M	pyriform	yellow, shaded with red.	
11	General Todleben.....	Belgium, M. Fontaine	US	10	L	oblong, obtuse py.	yellow, with russet dots, or patches of russet or brown.	
12	Josephine de Malines	Major Espereu, of Malines, France	SD	8	M	roundish obovate.....	green, turning yellow, with a little flush of red next the sun, large russet dots.	
13	Lawrence	Flushing, Long Island	U	8	M	obovate, obtuse, py.	lemon yellow, thickly dotted with minute brown dots.	
14	Louise Bonne	France	U	6	M	oblong, ovate, py.	pale green, overspread with brownish red in the sun, numerous grey dots.	
15	Mount Vernon	Samuel Walker, Roxbury, Mass	U	5	M	roundish, obtuse py.	yellow, nearly covered with light russet, brownish red in sun.	
16	Onondaga (Swan's Orange).....	Farmington, Conn	US	6	M	obovate, obtusely py	yellow, thickly covered with russet dots.	
17	Sheldon	Norman Sheldon, Huron, Wayne Co., N.Y.	U	...	M	roundish obovate, obo.	greenish yellow, nearly covered with light russet grey dots, brownish in the sun.	

PEARS.

DESCRIPTIVE LIST OF VARIETIES TESTED AT BAY OF QUINTE EXPERIMENT STATION, ETC.—Concluded.

Number.	Fruit.						Flesh.		Flavor.
	Cavity.	Stem. length.	Basin.	Calyx.	Color.	Texture.	Texture.	Flavor.	
1	S	1½ inch.....	shallow	partly open.....	white	buttery	buttery	sweet, stringent.	
2	S	1 inch, stout	very shallow	open	white	buttery, melting	buttery, melting	mushy, aroma, sub.-acid.	
3	S	1½ inch.....	shallow	open	white	tender, very juicy	tender, very juicy	sweet.	
4	S	1 inch to 1 inch.....	shallow	open	white	granular	granular	poor.	
5	S	½ inch to ⅔ inch	shallow	open	white	buttery, melting	buttery, melting	sub.-acid.	
6	S	½ inch thick	small	large, open	white	granular	granular	sub.-acid.	
7	S	1 inch to 1 inch.....	small, uneven.....	open	white	buttery, melting	buttery, melting	sub.-acid.	
8	S	1 inch	small	half open.....	greenish white	buttery	buttery	sweet.	
9	S	1 inch	shallow, even.....	open	white	melting, juicy	melting, juicy	sub.-acid.	
10	S	½ inch thick	small, wrinkled.....	partly closed	white	juicy, melting	juicy, melting	sub.-acid.	
11	S	2 inches	wide, furrowed	open	rosy tinge	melting, juicy, slightly granular.....	melting, juicy, slightly granular.....	mild, sub.-acid.	
12	N	1 inch, stout	shallow	open	rosy tinge	melting, juicy	melting, juicy	sugary, with a rich aroma.	
13	N	1 inch, stout	broad	open	whitish	juicy, melting	juicy, melting	sweet, aromatic.	
14	S	1 inch	uneven	open	greenish white	juicy, melting	juicy, melting	rich aromatic.	
15	S	1 inch	shallow	closed	yellowish.....	juicy, melting	juicy, melting	vinous and slightly aromatic.	
16	S	1 inch to ½	uneven	closed	white	buttery, melting	buttery, melting	vinous.	
17	.....	1 inch	broad	open	white	juicy, melting	juicy, melting	sweet, vinous, rich aromatic.

PLUMS.—*Concluded.*

DESCRIPTIVE LIST OF VARIETIES TESTED AT THE GEORGIAN BAY STATION: JOHN G. MITCHELL, CLARKSBURG, EXPERIMENTER.

Number.	Fruit.		Cavity.	Stem.	Suture.	Seeds or stone.	Flesh.			Season. (Months of use, as Dec. Mar.)	Dessert.	Cooking.	Quality. Scale 1-10		Remarks.
	Skin.	Bloom.					Color.	Texture.	Flavor.				Home market.	Foreign market.	
1	thin		N	slender	Ob	cling	deep yellow	juicy	pleasant, not rich	Sep	8	9	8	8	Hardest, most curious proof, profitable variety I know of. Slow grower.
2			none	long, stiff, set on end of fruit.	D	cling	yellow	firm	rich, sweet	Sep-Oct.	7	10	10	10	
3	thick, blue		S	slender	D	free	green	firm	sweet	Sep-Oct.	9	9	8	10	
4	thin, whitish		N S	long, slender	D	cling	yellow	coarse, juicy	not rich	Sep-Oct.	4	7	7	10	Sells well on account of its fine appearance. Too late coming into bearing. Should be planted with other varieties.
5	blue		D	long, slender	Ob	cling	greenish yellow	coarse	sweet, sub-acid	Sep	4	8	7	10	
6	thin		S S	short, stout	D	free	yellow	juicy	sugary, rich	Sep-Oct.	10	10	10	10	
7	light		S S	stout	L	semi-cling.	yellowish	coarse, juicy	pleasant	Aug-Sep.	8	9	10	10	
8			S S	long	Ob	free	pale yellow	coarse	sweet	Sep	7	8	10	10	Uncertain cropper.
9	white		S	long, stout	D	free	greenish	juicy, melting.	rich	Aug-Sep.	10	10	10	10	Does well here.
10	deep blue		D N	small, slender	D	cling	deep yellow	firm, juicy	rich	Aug-Sep.	6	9	10	10	
11			S B	short	Ob	free	yellow	firm	very sweet	Aug-Sep.	10	10	10	10	
12	blue		D	long, slender	Ob	cling	greenish yellow	coarse	sweet, sub-acid	Sep	4	8	7	10	Bears well after 8 years old.

NOTES ON VARIETIES.

I received this spring for testing at the Georgian Bay Experiment Station, at Clarksburg, thirty-six varieties of plums, thirteen of pears, eight of peaches, three of cherries, and a few raspberry plants. Of plums that I have already tested I will only refer to a few of the most desirable.

PLUMS.

Lombard, the fastest grower, hardiest, most curculio proof, and profitable all-round plum I know of. Ninety per cent. of all the plums in the Georgian Bay district this season are Lombards. Should be well fertilized and cultivated.

Glass Seedling, a strong grower; very hardy; attains a large size; bears well after eight or ten years old if planted with other varieties. I have known as much as twenty-four baskets to be taken off a single tree in a season.

Coe's Golden Drop, a slow grower, with short, stout shoots and glossy leaves; great bearer; a little liable to rot; but not badly here.

Reine Claude d'Bayay, a fine late plum, thought to be a little tender by some growers here, but I do not find it so; quality best.

Pond's Seedling, a strong, upright bearer like a poplar; bears young; fruit rather coarse, but sells well; should be headed back.

Quackenbos, much like Glass Seedling; bears younger; thought to be the parent grows large, lives long. Profitable for market.

Bradshaw, a fine large plum with reddish purple color; excellent quality; vigorous; productive; annual bearer.

Washington, fruit large, clean, yellow, marked with red; quality best; vigorous, productive every second year; does well here.

Smith's Orleans, large, reddish purple; grows well; bears abundantly; does well here.

APPLES.

It was once asked the question, "What varieties of apples can be grown in your district?" Well, I would like to know what varieties cannot be grown here. There are upwards of 225 varieties in the Beaver Valley and along the shore of the Georgian Bay. If the 200 were converted into the twenty-five best, the country would be a good deal better off. The following are a few of the best and most profitable varieties:—

Northern Spy, large, roundish conical; striped and covered with crimson on sunny side; overspread with a thin bloom, flesh, juicy, rich, aromatic, best quality; does remarkably well here.

Baldwin, too well known to need description; bears immense crop of fine, clean fruit.

Golden Russet, thriftily, upright grower; bears well.

American Russet, requires rich soil.

King of Tompkins Co., a fine apple; rather shy bearer, but bears well if top-grafted on Tolman Sweet or Russet. In fact, the finest Kings I ever saw were grown on a graft on Swayzie Pomme Grise.

Ben Davis, a rapid grower; early and annual bearer of heavy crops; sells well.

Gravenstein, the best of the fall varieties: fine grower; productive; quality best.

St. Lawrence, very free grower; healthy foliage; productive.

Fameuse, a good grower; bears well, but has spotted badly of late years. Grew a fine, clean crop this year, where properly treated with Bordeaux.

R. I. Greening, fine, strong grower ; spreading top ; bears young ; best quality.

Pewaukee, strong grower ; bears young ; fine, clean fruit with handsome bloom ; but drops badly on either clay or sandy soil.

I will just mention a few more varieties that will do well. Alexander, Colvert, Twenty Ounce, Seek-no-further, Ontario, Rox Russet, Blenheim Orange, Ribston Pippin, etc., etc., all grow to perfection here.

THREE YEARS' EXPERIENCE IN SPRAYING FOR CURCULIO.

1893. Sprayed plum trees as soon as the fruit set, with—water forty gallons ; Paris green 3 oz. Left six trees unsprayed for test. Result—the sprayed trees had a good crop ; the six unsprayed trees had but one plum and that one stung.

1894. Sprayed with same mixture and at same time, just when the fruit had formed. Left five trees unsprayed for test ; result—the sprayed trees were loaded to the ground. The five trees not treated did not carry a single plum, although equally well set with fruit.

1895. Sprayed again with water and Paris green as soon as fruit set. Left no trees unsprayed this time. Sprayed again in seven days with Bordeaux and Paris green. Result—all trees bore heavily according to setting of fruit.

EXPERIENCE IN SPRAYING APPLES.

1895. This year I sprayed part of my apple orchard before the buds had burst, and twice after. The trees treated in this manner bore beautiful clean fruit, with very few culls. The remainder of apple orchard which was not treated till the fruit set did not seem to be much benefited by the spraying. There is no doubt in my mind, but the early spraying is the most effective for apples and I shall continue it.

JOHN G. MITCHELL,
Experimenter.

PEACHES.

REPORT OF SOUTH-WESTERN STATION, 1895. W. W. HILBORN, LEAMINGTON,
EXPERIMENTER.

The fall of 1894 was very dry and peach trees ripened up their wood and fruit buds perfectly before cold weather set in. They therefore entered into winter quarters in perfect condition so far as the condition of the wood and fruit buds were concerned. The soil, however, was so dry when cold weather came that the frost penetrated very deep and quite a number of trees were root killed from this cause. Especially was this true in soils naturally very dry. The winter was the most severe known in this vicinity for many years. The fruit buds, nevertheless, came through in splendid condition, and a large crop of fine fruit was gathered this season. The late spring frosts so disastrous in nearly every other, perhaps I may say, every other portion of Ontario, did but little injury to the fruit crop in this locality. The early sorts of peaches ripened fully a week or more earlier this season than last. Late varieties were later in ripening than usual owing to the cool weather during their period of ripening. Salway and some of the other latest kinds were injured by the first hard frost which occurred October 20th.

It is not often that we get enough frost in this locality to injure the peach before November 1st.

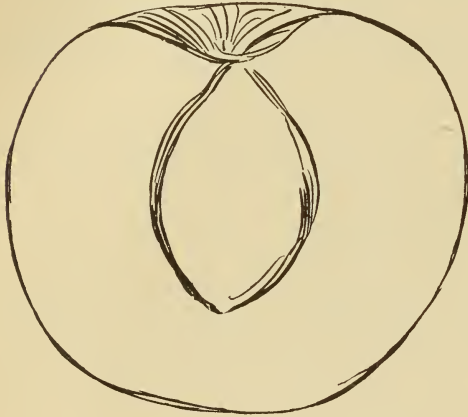
All of the earliest varieties have white flesh, and more or less cling to the pit. None of the early sorts are firm enough in flesh to stand shipping as well as the later and yellow fleshed kinds.

In selecting varieties for market it is best to choose the greatest number of such kinds as will produce large fruit of fine appearance, yellow flesh, and ripen mid-season. At this time the demand for peaches is very much the greatest. It is well, however, to plant such varieties as will give a constant succession from the first to the last of the season. In making up the list of kinds described below I have given them in the order of ripening this season.

NOTES ON VARIETIES OF PEACHES.

(In order of ripening.)

Alexander. This is the earliest sort grown in this locality. Ready for market this season July 23rd. Tree moderately strong grower—hardy and very productive. Fruit medium to large, nearly round, skin greenish white, nearly covered with deep, rich red, purplish in the sun. Flesh whitish with a tinge of green, half melting, juicy, sweet, partial cling.



Alexander, July 23, '95

Early Canada, Amsden's June and Waterloo are practically the same as Alexander.

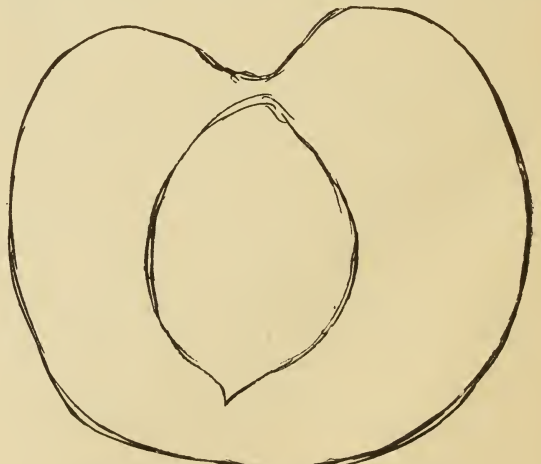
Early Rivers. Tree a good grower, hardy and very productive. Fruit round, medium to large, straw color with a delicate pink cheek, flesh melting and of fine quality. Partial cling, although not as much as Alexander, Not firm enough to carry well to a distant market. Ripe August 8th.

Hale's Early. Tree a good grower, hardy and very productive. Fruit medium size, nearly round. Skin greenish, mostly covered and mottled with red when ripe. Flesh white, melting, juicy, rich, sweet, nearly freestone. Ripe August 13th.

The fruit has been quite free from rot here, to which, it is subject in most localities.

Lewis' Seedling. Tree vigorous, very hardy and productive. Fruit medium to large, nearly round, color of Alexander except that the skin and flesh is a little lighter in color, good quality. Not fully tested here. Ripens August 15th.

Boyle's Yellow. Tree good grower, hardy and productive. Fruit above medium size. Skin very bright yellow, with a fine bright red cheek. Flesh yellow, melting, sweet, rich and of very fine quality. Ripe August 18th. This was the first freestone to ripen here. Its good quality, early ripening, fine appearance and productiveness, will, I believe, make it very popular when better known, both for home use and market.



Lewis' Seedling, 2½ in., August 15th, '95.

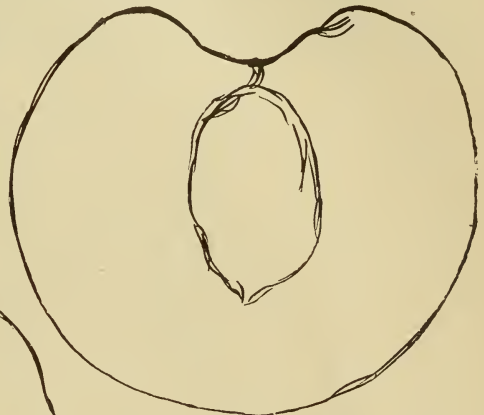
Mountain Rose. Tree vigorous, healthy and productive. Fruit medium or above. Skin whitish, nearly covered with red, flesh white, very good, freestone. Ripe August 20th.

Barnards Early. Tree a moderately strong grower, very hardy and productive. Fruit round, medium to large; (when the trees are not overloaded); skin yellow, nearly or quite covered with dark red; flesh rich and sweet, of good quality; red at the stone; freestone; one of the most reliable; ripe August 25th.

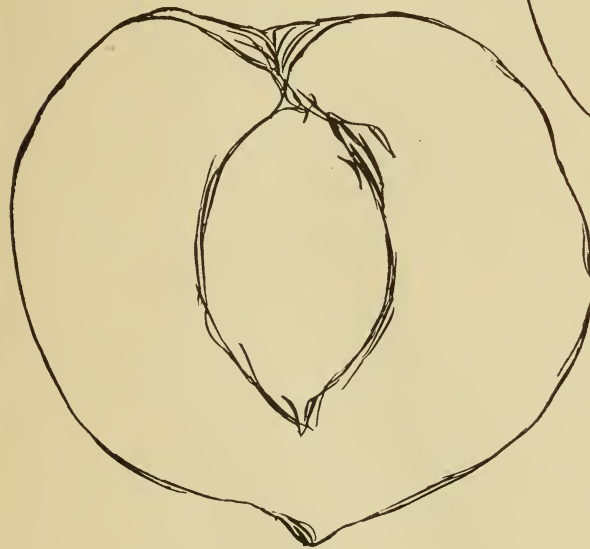
Early Crawford. Tree a free grower and productive, although the fruit buds are not quite as hardy as many other kinds. Fruit, very large; oblong; skin, yellow, with a fine red cheek; flesh, yellow, rich and of fine quality; freestone; ripe last of August.

Champion. This is a new variety that has been boomed quite extensively for the last two or three years. It was claimed for it that it was the earliest freestone known. It has been fruited this season in a number of orchards in this locality and all prove to be nearly or quite as much of a clingstone as Alexander. Tree a very free, strong grower; fruit medium to large; flesh, whitish green; quite soft; of good quality; clingstone; ripens about with Early Crawford. Present indications would show that it has no place in the commercial orchard. It is just possible that it will be valuable for the amateur, in localities not well adapted to peach culture on account of its hardness.

Oldmixon. Tree a vigorous grower, not quite hardy in fruit bud it therefore yields well only in favorable seasons. Fruit, large roundish; skin, pale yellowish white; marbled with red; cheek, a deep red; flesh, white; red at the stone; of the very best quality; not firm enough for shipping to a distant market; freestone; ripe September 1st.



Boyle's Yellow, 2 $\frac{3}{4}$ ins., August 18th, 1895.



Garfield, 3 in., August 27th, 1895.

Fitzgerald. Tree a good grower, hardy, and gives promise of productiveness, but not sufficiently tested to speak positively in this respect. Fruit resembles Early Crawford to some extent; of better quality; ripens a little later; one of the most promising new sorts for market and home use.

Yellow Rareripe. Tree a free grower, hardy and productive. Fruit, very large; roundish; skin, yellow, nearly covered with dark red; flesh, yellow and of the best

quality; not quite as firm as Early Crawford; ripe September 5th.

Elberta. Tree a strong, free grower; foliage very large, dark glossy green; fruit large to very large, roundish; skin yellow, with red cheek, sometimes nearly covered with red; flesh yellow, firm, rich and sweet; freestone. Promises to be one of the most valuable new peaches introduced. Its fine appearance, large size, firmness and good quality will place it in the front rank as a market peach should the tree prove as productive as it grows old as it is while young.

Garfield. Tree strong and vigorous; fruit of the early Crawford type. I have fruited it only on young trees; on these it produces larger fruit than does the early

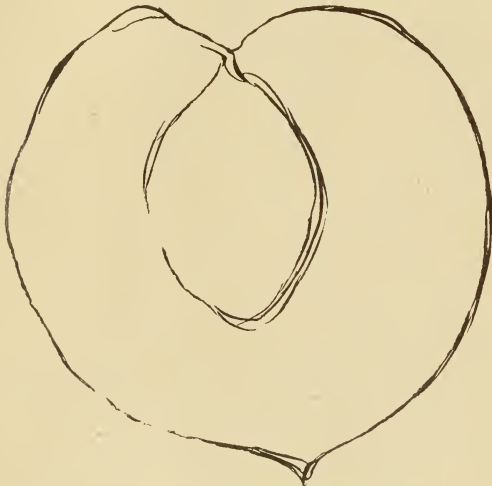
Crawford on trees of same age, equally as good in quality and appearance and in every other way as that old favorite, the early Crawford. Cannot say as to its productiveness. Ripens a little later.

Wheatland. Tree, a good grower of the Crawford type; unproductive with me, hence of no value up to present date.

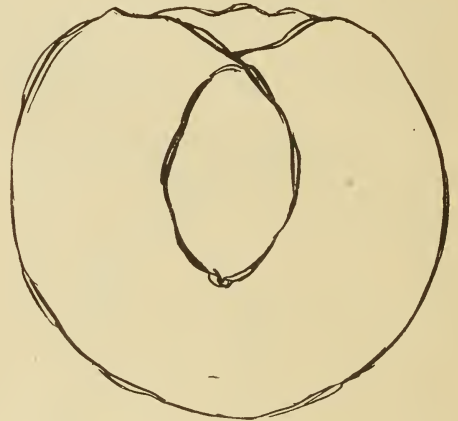
Tyhurst. Tree of small willowy growth; very hardy in wood and fruit buds, it therefore yields well annually. Fruit medium, round; skin, light yellow, sometimes carmine in the sun. Flesh, yellow, sweet, and of the best quality, freestone. Ripens middle of September.

Wager. Tree, moderate grower, healthy, hardy and productive. Fruit, medium in size, oblong, oval, varying in form, one side often enlarged. Skin, quite downy, of a light golden yellow when fully ripe; flesh, bright yellow, rather firm. Medium quality, freestone. Fruit drops quite bodily when about ready to gather. Ripens middle of September.

Engol's Mammoth. Tree, a vigorous grower, quite hardy and productive; fruit roundish; it will average quite large and uniform in size; skin, bright yellow, with bright red cheek; flesh, yellow, quite juicy, yet firm, good quality. Will not begin to decay as soon as most varieties, freestone. It now promises to be one of the most valuable market peaches for its season, which is the middle of September, or a little earlier.



Late Crawford, September 20th, 1895.



Golden Drop, September 25th, 1895.

Late Crawford. Tree, strong vigorous grower, moderately hardy; fruit very large, roundish; skin yellow, with a fine dark red cheek; flesh deep yellow, red at the stone, juicy and melting, with a very rich and excellent vinous flavor. Ripens latter part of September; freestone; one of the most valuable market peaches.

Jacque's Rareripe. Tree, strong vigorous grower, quite hardy and productive; fruit large, roundish, compressed; skin dark yellow, mostly shaded with dull red, flesh yellow, red at the stone, juicy, slightly subacid, freestone. Latter part of September.

Golden Drop. Tree a moderately vigorous grower, hardy in woody and fruit buds, very productive; fruit medium or a little above, round; skin yellow, sometimes shaded with carmine in the sun; flesh yellow, sometimes a little dry, but of quite good quality, especially for canning purposes, freestone. Ripens the last of September.

Hill's Chili. Tree of small willowy growth, very hardy in wood and fruit buds; a very productive annual bearer; fruit large, dull yellow, shaded with dull red, very downy; flesh yellow and of fair quality, freestone; good for canning; one of the most reliable varieties grown.

Crosby. Tree of low willowy growth, very hardy in wood and fruit buds, productive; the fruit is roundish, medium size, bright orange yellow, splashed with streaks of carmine on the sunny side; flesh yellow, juicy sweet, mild flavor, freestone. Ripens here on young trees last of September.

Lemon. Tree very vigorous, hardy, and the most wonderfully productive of any variety tested by me up to present date; fruit very large, oval, pale lemon yellow, of good quality, sweet and rich; one of the best flavored when canned, freestone. Ripens first week in October.

Smock Free. Tree vigorous and productive, although the tree requires more age than many other varieties before it produces heavy crops, about the same as the Crawford's in this respect. Fruit large, oblong; skin light orange yellow, mottled with red; flesh bright yellow, red at the stone. A splendid variety for shipping to distant markets.

Salway. Tree vigorous and productive; fruit medium to large; skin greenish yellow, suffused with red; flesh greenish yellow, good quality. Ripens last of October. The latest peach that can be grown in this locality with profit. This season they were not quite all ripe when the first frost occurred October 20th.

The most profitable varieties this season were Alexander, Early Crawford, Barnard's Early, Tyhurst, Late Crawford, Hill's Chili, Lemon and Smock.

The varieties most hardy in fruit buds are Alexander, Barnard's Early, Tyhurst, Hill's Chili, Crosby and Lemon. The latter ripens rather too late for the most parts of Ontario. Perhaps the two best varieties for unfavorable localities would be the Tyhurst and Hill's Chili. Where these two sorts cannot be grown, I think there would be little use of planting any other kinds.

HINTS ON THE CULTIVATION OF THE PEACH.

The peach tree is more tender than the other standard fruits grown in Ontario. We must therefore give it the most favorable location we can find.

LOCATION. For the best success of the peach we must have a high, sandy or gravelly loam near a body of water. This must be naturally well underdrained to the depth of ten or fifteen feet. A northern slope is preferred. If such conditions cannot be secured, it is useless to go into the cultivation or the peach extensively with the expectation that it will meet with that measure of success desirable.

It is true many farmers throughout Ontario could plant a few trees for family use, and with proper care obtain a crop of fruit in favorable seasons. For this purpose plant such hardy kinds as Tyhurst and Hill's Chili on the north side of a building or on the northern slope of a hill. Never select the south side of a building, as that is not a favorable location for any tree not perfectly hardy. The sun's rays reflecting from a building will injure the wood of any tender tree standing near enough to catch the reflected heat.

Our method of planting and cultivating, which I see no reason to change, is about as follows: Select medium size trees, one year old from the bud. Shorten in the roots, and cut off all side branches of the top if there is good strong buds on the main stem. Cut this back to two or two and a half feet in height. Each succeeding spring we thin out superfluous branches, and shorten in the new growth nearly one-half until the trees begin to bear fruit in quantity. When the trees bear large crops of fruit they do not make such long growth of wood, and require less pruning.

Cultivate often and thoroughly, from early spring until midsummer. If no other crop is grown among the trees, sow to rye about the 1st of September; this will form a covering for the soil during winter, and some food for the trees when ploughed under in early spring. The rye also absorbs some of the surplus moisture during the growing autumn season, which prevents a late growth of wood on the trees that would otherwise take place. If we expect to have the trees go through the winter uninjured, we must have the wood ripened up thoroughly when cold weather sets in. The soil among the trees should not be ploughed deep at any time after the roots have made sufficient growth to be in danger of being disturbed by the plough.

One of the most important considerations in cultivating any orchard is to stir the soil, always to about the same depth, the roots are not then disturbed to any injurious extent.

W. W. HILBORN.

Southwestern Experiment Station,
Leamington, Ont.

GRAPES.

TESTED AT THE WENTWORTH EXPERIMENTAL STATION; M. PETTIT, WINONA, EXPERIMENTER.

Species: E. *Aestivalis* R. Riparia; L. Labrusca; H. Hybrid; X. Cross.
Size: S. Small; M. Medium; L. Large.
Form: L. Long; S. Short; Sh. Shouldered.
Compactness: C. Close; L. Loose; S. Straggling.

Shape of berry: O. Oval; R. Round.
Color: B. Black; P. Purple; R. Red; W. White L. Light; D. Dark.
Seeds: S. Small; M. Medium; L. Large.

Variety.	Vine.				Bunch.				Berry.				
	Origin.	S pedes	Foliage.	Form.	Compactness.	Size.	Shape.	Skin.		Pulp.	Flesh.		Seeds. Number and size.
								Color.	Thick- ness.		Color.	Flavor.	
1 Adirondac	Uncertain	L	weak	L	C	L	O	B	thin	tender	best	best	2, s.
2 Alvey (Hagar)	E. X. V. Maryland	EH	heathy	L Sh	L	S	O	B	thin	none	sweet, vinous	sweet, vinous	
3 Agawam (Rog. 15)	Black Hamburg X Native Mammoth. E. S. Rogers, Salem, Mass.	LH	thick	S	L	L	R	D R	thick	soft	sweet, sprightly, aromatic	sweet, sprightly, aromatic	3-4, L.
4 Amber	Taylor seedling	X	weak	L	St	M	O	L	thick	tender	medium	medium	
5 Amber Queen	Massachusetts	LH	thick	Sh	C	M	O	P	thin	tender	medium	medium	
6 August Giant	Hamburg X Marion, Mass	RH	very strong.	Sh	C	L	O	B	thin	tender	medium	medium	
7 Barry (Rog. 43)	Clinton Seedling	LH	heathy	S	C	L	R	B	thick	tender	sweet, pleasant	sweet, pleasant	
8 Black Pearl	Concord X Diana Hamburg	R	heathy	S	C	M	R	B	thin	very sour	very sour	very sour	
9 Brighton	Jacob Moore, Brighton, N. Y.	LV	thick	L Sh	L	L	R	R	thin	very little.	sweet, aromatic and vinous	sweet, aromatic and vinous	3, M.
10 Catawba	North Carolina	L	medium	L	C	L	R	R	medium	slight	rich, vinous, musky	rich, vinous, musky	
11 Cottage	Concord Seedling	L	heathy	L S	C	M	R	B	thin	medium	medium	medium	
12 Creveling	Columbia Co., Pa.	LH	heathy	L	S	L	O	B	thin	medium	medium	medium	
13 Diana	Catawba Seedling	L	heathy	Sh	C	L	R	R	thick	hard	musky	musky	
14 Dracut Amber	J. W. Manning, Dracut, Mass.	L	thick	S	C	S	R	R	thick	hard	musky	musky	
15 Duchess	White Con. X Del. or Walter. A. J. Caywood, Newburgh, N. Y.	LH	medium	L	C	S	R	R	thin	none	best	best	1-2, S. few.
16 Eldorado	Con. X. Allen's Hy	R	heathy	L	St	L	R	W	thin	tender	medium	medium	
17 Empire State	Hartford X Clinton L X	E	medium	L	C	M	O	W	thick	tender	medium	medium	
18 Emmelan	Chance Seedling	E	medium	M	C	M	R	B	thick	tender	medium	medium	
19 Goethe, Rog. (No. 1)	Rog. Elyb	H	heathy	Sh	C	L	O	L	thick	tender	very fine	very fine	few.
20 Jefferson	Concord X Iona	L	thick	L Sh	C	M	R	R	thin	tender	medium	medium	

GRAPES.—*Concluded.*

TESTED AT THE WENTWORTH EXPERIMENTAL STATION : M. PETTIT, WINONA, EXPERIMENTER.

Variety.	Vine.			Bunch.		Berry.						
	Origin.	Species.	Foliage.	Form.	Compactness.	Shape.	Skin.		Pulp.	Flesh.	Seeds. Number and size.	
							Color.	Thick-ness.				
21 Lady	Concord Seedling	L	healthy	S	C	S	W	thin	tender	medium		
22 Lady Washington	Con. X Allen's Hy.	H	healthy	Sh	C	L	W	thin	tender			
23 Lindley (Rog. 9)	Golden Chasselas X Wild Mammoth	LH	strong	L	L	M	R	thick				
24 Marion	Pennsylvania	R	thin	S	L	S	B	thin				
25 Martha	Concord Seedling	L	light	Sh	L	S	W	thin	pulpy		1-2, S.	
26 Massasoit (Rog. 3)	Roger's Hybrid	LH	healthy	Sh	S	L	R	thin	tender			
27 Missouri Riesling	Taylor Seedling		healthy	S	C	S	W	thin		medium		
28 Moore's Early	J. B. Moore, Concord, Mass., Concord Seedling	L	thick	S	C	L	B	medium	hard	good		
29 Moore's Diamond	Concord Seedling		healthy	S	C	M	W	thin	tender			
30 Noah	Seedling of Taylor, Ill	R	strong	L	C	M	W	thin	hard			
31 Perkins	Massachusetts	L	thick	S	C	M	O	thick	pulpy		few & S.	
32 Prentiss	J. W. Prentiss, Pultney, N. Y., Seedling of Isabella	L	.....	S	C	M	O	medium				
33 Rebecca	Chance Seedling, N. Y. State	L	weak	S	L	S	O	thin	none		small.	
34 Requa (Rog. 28)	Chance Seedling, N. Y. State	LH	strong	S	C	L	R	thin				
35 Salem	Hamburg X Wild Mammoth	JH	strong	Sh	C	L	R	thick			large.	
36 Taylor	R. X. L.	RL	strong	S	C	S	W	thin	none			
37 Vergennes	Chance Seedling	L	strong	L	C	L	R	thick				
38 Wilder	Seedling of Concord	LH	strong	Sh	C	L	R	thick	slight			
39 Worden .....	.....	L	strong	Sh	C	L	B	thin				
40 Wyoming Red .....	.....	L	strong	S	C	S	R	thin	hard			

WENTWORTH STATION. RECORD FOR YEAR 1895.

GRAPES.

Variety.	Origin.	When planted.	Soil.	Cultivation.	Fertilizers used.	Winter protection.	Weather favorable or unfavorable.
Agawam	Rog. Hybrid	1887	Clay	Ploughed twice and cultivated frequently.	none	No protection.	unf'vr'ble.
Brighton	Con. X Diana, Ham	1882	"		stable manure ..		favorable.
Concord	E. W. Bull, Con., Mass.	1874	"		"		"
Catawba	North Carolina	1883	"		"		"
Delaware	Unknown	1874	"		"		"
Lindley	Rog. Hyb	1887	"		"		"
Moore's Early ..	Con. Seedling	1887	"		"		too dry.
Moyer	Chas. Reid's seed	1886	"		ashes & st. man.		favorable.
Niagara	Con. X Cassady	1882	"		stable manure ..		"
Worden	Con. Seedling	1884	"		"		dry.
Wilder	Rog. Hybrid	1884	"	"	"	"	

GRAPES.—Continued.

Variety.	Date of maturity.	Date of gathering. (Berries first and last.)	Yield.	Grade. Per cent.			Average price.	Remarks.
				Class 1.	Class 2.	Class 3.		
Agawam	Oct. 4	Oct. 15	4½	4½	Injured by spring frost.	
Brighton	Sept. 7	Sept. 9	16	15	1	.....	
Concord	" 12	" 25	17	17	Frosted before fully ripe.	
Catawba	Oct. 21	Oct. 21	19	16	2	1		
Delaware	Sept. 5	Sept. 12	11	11	.....	.....
Lindley	" 2	" 15	21	21	.....	.....
Moore's Early ..	Aug. 24	" 2	5	5	.....	.....
Moyer	" 22	Aug. 28	13	9	3	1		
Niagara	Sept. 12	Sept. 20	23	22	1	.....	
Worden	" 2	" 10	21	20	1	.....	
Wilder	" 18	" 30	17	15	2	.....	

NOTES OF EXPERIMENTAL WORK.

I beg to submit the following report of the work that is being carried on at the Wentworth Experiment Station.

There have been about 160 trees and vines added to those planted last year. The greater part of these are grapes and plums, some pear, cherry and currants.

The grape crop at this station was very fine, both quantity and quality were above the average. We had no mildew or any form of fungus. Even the Salems were heavily laden with fine clean fruit.

The thrip was the only insect enemy that appeared to any extent and considerable damage was done to some of the thin leaved varieties. It was our intention to test the coal oil emulsion for this pest but the work was neglected.

Careful experiments were made with Bordeaux mixture on apples, pears, plums and grapes. There was no perceptible difference except in Flemish Beauty pears, owing to the absence of fungus.

I cannot report very satisfactory results from spraying with Paris green for codling moth. A Greening orchard carefully sprayed, with several trees left for check gave very little in favor of spraying. A greater portion of the first brood may have been destroyed, but the second hatching which destroys the pears and apples when they are about full grown, did considerable damage on apples, Bartlett and Keiffer pears. We hope in a few years to be able to report valuable information in reference to some of the Japan plums which are awakening considerable interest among the fruit growers on account of the earliness of some of them.

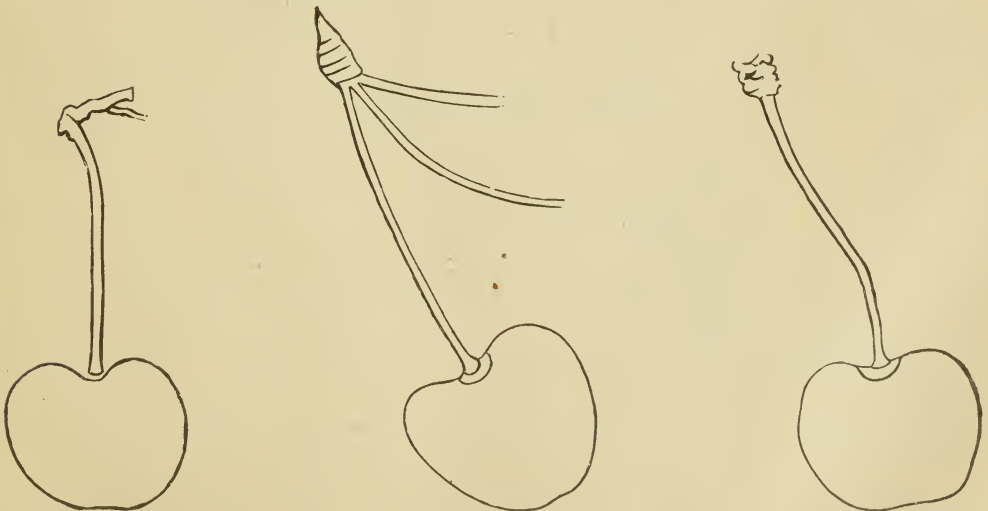
We have also started a series of experiments with fertilizers to stimulate the growth of young tree and vines and trust in a few years we may have some valuable information to report.

M. PETTIT,
Experimenter.

NOTES ON SOME LEADING VARIETIES OF CHERRIES.

BY THE SECRETARY.

The first really good cherry of the season with me is the Governor Wood. True, we have Early Purple preceding it about a week or so, but it is not a meaty cherry, and is



GOVERNOR WOOD.

BLACK TARTARIAN.

KNIGHT'S EARLY BLACK.

nearly always eaten by the birds before it is harvested. The Governor Wood, on the other hand, is not so subject to the ravages of the birds, and is a delicious white-heart

cherry of the best quality. This year it began ripening about the 16th of June and continued until about the 26th.

It is a productive variety also; one tree this season yielded seventy-two quarts and that might be looked upon as about half a full crop, for about half was destroyed by the frost. The tree, of course, is a full-grown one, being about thirty years planted. The variety originated in Ohio.

There are several other varieties of white cherries ripening about with the Governor Wood, which we will speak of more fully some other time, *e.g.*, the Rockport, American Amber, Coe's Transparent and Elton. The latter is a particularly fine flavored white-heart cherry of great value for canning, except for its soft flesh and its tendency to rot in wet seasons.

The Black Tartarian is the most prominent of our black-heart cherries, and, although of Russian and West Asian origin introduced into England about one hundred years ago, succeeds admirably in the Niagara peninsula. The fruit is of tender flesh, dark colored and juicy, of large size, rich flavored and delicious. Birds as well as men have a special preference for this cherry, and its tender flesh especially invites the former. Therefore, in order to secure the crop, we find it necessary to begin harvesting them on the green side. The picking of this cherry began with me this year on June 22nd, and the fruit not picked hung until the 30th.

The Tartarian cannot be called a heavy bearer, because the fruit does not grow in such clusters as that of some other varieties, but the large size to a certain extent makes up for the number on the cluster.

Of the other black-heart cherries, we will briefly refer to the Knight's Early Black, which ripens a few days in advance of the Tartarian. The fruit is not quite so long and is a little more obtuse heart-shaped; it is a little more even in outline, otherwise it much resembles the latter variety. The fruit is inclined to grow singly and this makes the gathering rather slow; besides it is less productive than the Tartarian. A full grown tree at Maplehurst yielded about thirty quarts in 1895, and this may be called a full crop.

The Black Eagle succeeds the Tartarian, beginning to ripen this season about the 28th of June. It is a delicious heart cherry, if anything smaller than the Knight's Early Black. The fruit is grown in somewhat sparse clusters, and the tree is only



A BRANCH OF THE BLACK EAGLE.



NAPOLÉON BIGARREAU.

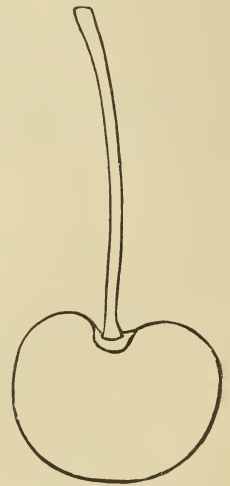
moderately productive, our large trees giving about forty quarts each. The accompanying engraving will show the clusters on a branch of this variety.

Of the Bigarreau cherries, the leading variety for productiveness is the Napoleon Bigarreau. It is the habit of this variety to load in great clusters, a great advantage in harvesting, provided the fruit is free from rot. This variety is unfortunately very subject to this disease, and sometimes almost a whole crop is destroyed by it. Otherwise this is the most productive of all varieties, a hundred quarts being a very ordinary yield from a full grown tree. We add an outline of the cherry in order to show the exact size. The skin is white, well shaded with light red, and the flesh is very firm. It is one of the largest of cherries and altogether well fitted for the commercial orchard.

The Yellow Spanish is another magnificent variety, often exceeding in size even the Napoleon, especially when the crop is light, as indeed it too often is. It too is sadly subject to rot. In the year 1894 I did not gather a single basket, from this cause; every cherry rotted before ripening. This year, however, the case was wholly different,



A BRANCH OF THE YELLOW SPANISH.



YELLOW SPANISH.

and it exceeded all past records of productiveness. One fine old tree yielded 132 quarts of the finest sample of cherries, and here again I have brought our camera into use to show a branch from this very tree, and the beautiful clusters of large-sized fruit. The skin of this cherry is yellowish white, with deep red blush, and the flesh firm and also yellowish in color.

This variety is the favorite one at Maplehurst for canning for home use. It began ripening this year about July 1st. I add an outline in order to give a more correct idea of the size as grown in 1895.

Of this same Bigarreau, or firm-fleshed type, we have two excellent black cherries ripening late in the season, viz., the Tradescant's Black Heart, an old and well-known European variety of dark purple skin and firm flesh and good quality. It is a very pro-

ductive cherry and one that carries well to market. The other is the Windsor, a new variety of Canadian origin, which is rapidly gaining favor with planters as an excellent late black cherry. The tree of this variety at Maplehurst is only three years planted. It is evidently a strong, vigorous grower, and quite productive. The cherry is obtuse, heart-shaped, dark red in color, and the flesh quite as firm as that of Tradescant's Black Heart. The quality seems excellent for all purposes. It ripens on the 5th of July, and hangs on the tree until the 13th. Cherries picked and left in the house keep without change two or three days. The fruit is borne in clusters which are very easy to gather.

The Early Richmond is a valuable cherry for pies and for canning. The tree is hardy and may be grown much farther north than the Heart and Bigarreau cherries above mentioned, besides it is profitable to grow for market. One difficulty attends it wherever grown, and that is its susceptibility to black knot.

There is also a large fruited Montmorency offered for sale which seems to be larger and later than the Early Richmond. It is a promising variety.

My Wragg trees have been planted five years, and are this year heavily laden with fruit. This variety has no very great merit to commend it that I can see, for the fruit is scarcely as thrifty as the Late Kentish, and the fruit is no better, if as good. Possibly it is hardier, and possibly more productive; certainly this season it does outbear that variety. The color is a darker red than the Kentish, and the flavor scarcely as good.

The harvesting of the cherry crop is not so great a difficulty as many imagine. A good man will easily gather fifty quarts a day, and with some varieties, such as the Napoleon, he will gather one hundred quarts or more. The usual cost of picking cherries, therefore, is from one and one-half cents to two cents per quart.

They are usually packed in eight or twelve quart baskets; but this season I packed the finest in a more fancy package, viz., in boxes with sliding covers, holding about three quarts each. The cherries were packed from the bottom, paper of a suitable color being first laid against the lid. The cherries were rowed neatly against the top and the box turned over and bottomed.

THIRD ANNUAL MEETING OF THE BOARD OF CONTROL.

The Board met at Woodstock on Tuesday, December 10th, 1895. There were present the President, the Secretary, the Official Visitor, and Messrs. A. M. Smith and A. H. Pettit.

The minutes of the last meeting were read and approved, and the report of the work done by the Executive was also read and approved.

An informal report of his experiments in spraying, according to the scheme formulated by this Board, was presented by Mr. A. H. Pettit. He had first called a meeting of the farmers and fruit growers at each of the thirty points at which the experiments were to be made, and addressed them, explaining fully the nature of the work to be undertaken. He then asked them to appoint a committee to select such an orchard as was believed by them to be best suited for the experiments under contemplation. This having been done, he interviewed the different pump makers of the province and invited them to a public test of their pumps side by side in his own orchard, and agreed to use such pumps as were proven by actual experience to be suitable for the work. He then chose three young men who accompanied the three spraying outfits. Work was begun in the southern division on the 24th of April, and on the 26th in the northern division, continued by a succession of visits to each point until the sixth application had been made. The longest time that any tree in the thirty points selected was left unsprayed was an interval of fourteen days. After all this work had been accomplished, Mr. Pettit visited the various points to take notes for his report. In a few places no results were observed, owing to the frost and drouth, but in most instances he could observe, first, an improvement in the foliage,

second, that the apples were cleaner and larger, and third, less injury from the codling moth on the sprayed than on the unsprayed trees. A detailed report of the work done by Mr. Pettit will appear elsewhere.

It was ordered that samples of fruit be put up by the various experimenters for the Industrial Fair, Toronto, and for the Imperial Institute, London, England, the former to be afterwards forwarded to the Ontario Agricultural College, Guelph.

It was ordered that the Secretary be authorized to purchase forthwith a microscope and camera, to be used under the directions of the Board, the expense to be met out of the grant of the current year.

It was agreed that experiment stations be located at the following places during the year 1896, in accordance with the recommendations of the official visitors: Maitland, Whitby, St. Catharines, Freeman, Nantye.

Ordered that the Secretary and the Horticulturist of the Ontario Agricultural College constitute a committee of nomenclature, and shall be responsible to this Board for the correct naming of varieties on exhibition.

The report of the official visitor to stations, by Mr. H. L. Hutt, Horticulturist, Ontario Agricultural College, Guelph, was then presented, as follows:

INSPECTION OF FRUIT EXPERIMENT STATIONS.

It has been my pleasant duty to visit and inspect during the summer all of the stations already established. Each station was visited at the most opportune time for taking note of the particular kind of fruit grown there. At every station, I am glad to say, good work is being done, and valuable information is being gained, which will be given to the public in the annual reports from the experimenters.

In company with Mr. L. Woolverton, Secretary of the Ontario Fruit Growers' Association, I also visited a number of other places in different parts of the province where it is thought desirable that stations should be established, our object being to learn as much as possible about the fruit interests of these sections and find competent fruit growers to undertake experimental work.

The following is a brief report on visits to the stations established last year:

THE WENTWORTH STATION.

May 23rd, 1895. Visited the Wentworth station, where Mr. M. Pettit, Winona, is making a specialty of grapes. Found everything under good cultivation and well cared for. Spraying with copper sulphate solution had been done before the appearance of the foliage, and also with the Bordeaux mixture before the appearance of blossoms.

The severe frosts of the previous two weeks had killed the new growth on the young vines at the north end of the place; the large vineyards, however, at the back and more under the lee of the mountain had escaped with little or no injury. Pears and plums also at the front were seriously thinned out with the frosts, while a block of one hundred Greening apple trees close under the mountain was white with bloom.

The plot of ground devoted to the planting of new varieties was in first-class condition, and the young trees and vines were doing nicely.

Sept. 25th. Visited Mr. Pettit's again at the height of the grape harvest when all hands were busy picking, packing and shipping grapes. In most parts of the vineyard the vines were heavily laden and presented a magnificent sight. From the twenty acres in bearing Mr. Pettit estimated the crop would be between sixty and seventy tons. This was being disposed of at the rate of about two tons per day, shipped mostly to regular customers or retail dealers in various parts of the province. In this way Mr. Pettit realizes much better prices than by shipping to commission men in the large and usually over-stocked markets.

Owing to the light crop of fruit in all parts of the country, except where it was protected from frosts by the proximity of some mountain or large body of water, the prices this year are unusually good, and fruit growers in such favored sections are making up for the low prices obtained in other years when fruit has been abundant.

THE SOUTH-WESTERN STATION.

Sept. 26th. Visited the station at Leamington, in Essex county, where Mr. W. W. Hillborn is making a specialty of peaches and strawberries. Our visit to this station last year was on the 15th of June, during the strawberry season; this year we deferred it till September, to see it at the time of peach harvest.

Although peaches are grown to a certain extent all over this county, they are most extensively grown along a narrow ridge of land in the southern part of the county running parallel with the lake shore. "The Ridge," as it is called, is about five or six miles long, and varies from half a mile to a mile and a half in width. The soil is a light, dry sand, so dry, in fact, that for the last two years the strawberries growing on it have in many cases been killed out during the hot weather of mid-summer. Its peculiar adaptability, however, to peaches makes it valuable, and in consequence of this being the only section in Ontario where the peaches were not injured this year, the price of land along "The Ridge" has risen nearly \$20 per acre.

Mr. Hillborn has about 100 acres planted with peach trees, and expects to put out twenty-five acres more next spring. As yet most of the trees are young and not in bearing. From five acres bearing this year he picked about 900 baskets, which were sold by contract for 84c. per basket.

He has under test over 100 varieties, about forty of which will be bearing next year. Full reports as to the value and productiveness of each of these varieties will be given from year to year in the annual report, so that valuable information for peach growers may soon be looked for from this station.

THE GEORGIAN BAY STATION.

On August 29th, after two days spent among the fruit growers of Walkerton and Port Elgin, and a sixty-mile ride across country on the bicycle, we reached our plum experiment station at Clarksburg. By taking note of the orchards along the road, the influences of the waters of the Georgian Bay upon the climate of that section might readily be seen. In all of the orchards inland and in many places up to within a mile or two of the shore, the spring frosts had destroyed the blossoms and there was little or no fruit. Along the bay shore, however, many orchards might be seen laden with fruit, and in some cases the branches were propped with poles to enable them to bear their load.

The orchards of Mr. John Mitchell, our experimenter at Clarksburg, being a couple of miles from the bay, had suffered somewhat from the frosts, and were bearing about half a crop. The varieties of apples bearing most heavily were Kings, Baldwins, Ribston Pippins, Cayuga Red Streaks, and Greenings. Northern Spys had not bloomed at all. Duchess of Oldenburgs, which were then all harvested, had been a good crop, and had brought \$2.50 per barrel in St. Mary's and Stratford.

Plums, of which fruit Mr. Mitchell is making a specialty, were seriously injured by the frosts. Those varieties which had escaped uninjured and were bearing heavily were Lombards and Duane's Purple. The fruit of these was finding ready sale at \$1.25 per basket. Mr. Mitchell has about five hundred thrifty young plum trees in bearing, and in the new plot devoted to variety tests, thirty-seven varieties were planted this spring, three trees of each. Besides these, he is testing a few of the hardier varieties of peaches, pears and cherries.

Mr. Mitchell is a thorough cultivator, sprays his orchards carefully for insects and fungous diseases, and takes a lively interest in the fruit industry of his section.

THE SIMCOE STATION.

August 30th. Visited the Simcoe station, where Mr. G. C. Caston, of Craighurst, is testing hardy varieties of apples, pears and cherries and some of the small fruits. Craighurst being somewhat inland, the fruit in this section was seriously injured by the spring frosts. * In Mr. Caston's apple orchard there was about a quarter of a crop. The varieties bearing most heavily were Wealthy, Spitzenburg, Baxter, Golden Russet, and Tolman Sweet. Some young Wealthy trees were heavily laden, proving well the hardiness and productiveness of this variety.

Good cultivation and thorough spraying, such as Mr. Caston gives his orchards, may accomplish wonders in most seasons in producing fine fruit. But in seasons like this, where the frost takes everything, cultivation and spraying can avail nothing, except to keep the trees in a vigorous and healthy condition for future crops. It was on account of the scarcity of fruit in Mr. Caston's orchard this year that he was unable to make the display at the Toronto Exhibition he otherwise would have made.

Among his young trees of apple and pear, planted this spring, there was not a failure, all of them at the time of our visit showing a good growth. The currant and gooseberry bushes planted this spring were also doing well. Mr. Caston has got a number of Russian varieties in the nursery row, ready for planting another year.

THE BAY OF QUINTE STATION.

September 4th. We arrived at Trenton, and after wheeling out four miles on an up-hill, dusty road, we reached the home of Mr. W. H. Dempsey, the manager of the fruit experiment station for this section. Mr. Dempsey's specialty is apples. His orchard covers about forty acres, of which nearly all the trees are in bearing. Mr. Dempsey and his father, the late P. C. Dempsey, always had a taste for originating and testing new varieties, and on this account Mr. Dempsey's orchard probably contains a greater number of varieties than any other apple orchard in the province. He has growing over 150 varieties, twenty-three of which are carefully described and reported on in last year's report.

The spring frosts, so injurious in most places, had done very little damage here. It was estimated that his crop would be over 1,500 barrels, and as most of the apples this year are of unusually good quality, the greater part of the crop will be A1 marketable fruit.

To enable him to pick and ship his fruit to advantage, Mr. Dempsey has built a large two-story fruit house, the walls of which have been made frost proof, so that apples may be stored in it all winter, and sold in the best markets.

"MAPLEHURST" FRUIT FARM.

When giving an account of visits to the different fruit experiment stations already established, and which we expect in time to contribute valuable information to Ontario fruit growers, it may be well to mention "Maplehurst," the fruit farm of Mr. L. Woolverton, Secretary of the Ontario Fruit Growers' Association, and editor of *The Canadian Horticulturist*, for probably no other fruit farm in the province has afforded more information to fruit growers than that of the editor of *The Horticulturist*.

"Maplehurst" is about a mile west of the village of Grimsby, and consists of a 100-acre strip of land about a mile long, running from the mountain to the lake. It embraces a great variety of soils, from a light, loamy sand to a heavy clay. This, in connection with the wonderfully favorable climate and shelter of the mountain, makes it well adapted to the production of all kinds of fruits grown in Ontario, and all of these are grown here more or less extensively, as the entire farm is planted to fruit.

Besides growing fruit for profit, Mr. Woolverton plants largely every year as a student of horticulture. Nearly every new fruit promising to be of any value is given a trial. Last spring about 130 new varieties were planted, embracing pears, peaches, plums, apricots, cherries and grapes. By planting annually in this way, and keeping careful records, Mr. Woolverton, as editor of *The Horticulturist*, is enabled to advise his readers with authority as to the merits of new fruits constantly being brought before the public. His collection of varieties of cherries is one of the largest in the province and it is hoped we may glean valuable information from his reports on these.

PROPOSED NEW STATIONS.

The following notes are on visits made to different persons with a view to finding suitable places for new stations :

MARTIN BURRILL, ST. CATHARINES, LINCOLN COUNTY.

Visited May 24th, 1895. Situated four miles west of St. Catharines, and half a mile from the lake. Farm of twenty-five acres, seventeen acres in fruit. Soil very variable, from light loam to heavy clay, partly rolling.

The following fruits are being grown : Four acres, or about 1,000 peach trees, in bearing, twelve varieties ; two acres peaches, newly planted ; 200 pear trees, mostly in bearing, twelve varieties ; 150 cherry trees, six varieties, mostly Early Richmonds ; fifty quince trees, two varieties ; 800 grape vines, about twelve varieties ; about half an acre of strawberries and other small fruits ; few apples.

Mr. Burrill is an energetic young man, enthusiastic in fruit growing. He takes an active part in the local farmers' institutes, and has made for himself a reputation as a thoroughgoing fruit grower.

STANLEY, SPILLET, NANTY, SIMCOE COUNTY.

July 9th, 1895. Three miles north of Lefroy station and twelve miles south of Barrie—lot of two and a half acres, but more can be bought from an adjacent farm—soil, a moist, sandy and clay loam, well adapted to growing gooseberries. Land all well underdrained, heavily manured and thoroughly cultivated. The following fruits are grown : Gooseberries, raspberries and strawberries, and a few trees of plums, pears and cherries. Most of the ground is devoted to growing gooseberries, of which he has about 700 bushes of twenty different varieties. Plot of new varieties put out this spring.

His Champions were remarkably prolific, and his Downings very large. All had been sprayed. Mr. Spillet uses a small Clarksburg pump on a barrel, mounted on a handcart. He also used flower of sulphur for mildew. His bushes are planted six by four feet apart and trained in the bush form.

Mr. Spillet is an elderly man, and has taught in the neighboring rural school for the last thirty years, but is resigning this year. He is a careful, reliable man, enthusiastic in gooseberry growing, and should make a good experimenter ; was busy when we called making drawings of the different varieties of berries. He grows gooseberry plants every year for E. D. Smith, of Winona.

REV. E. B. STEVENSON, FREEMAN, HALTON COUNTY.

Mr. Stevenson is a Methodist minister, now stationed at Freeman, near Burlington. Nearly all of his strawberries, however, are grown on the fruit farm of his father, near Guelph, which he visits frequently.

Mr. Stevenson has all his life been growing and testing everything new in the line of strawberries, and is, without doubt, one of the best authorities in the province on the varieties of strawberries.

He has about 200 varieties under test, forty-two of which were reported on in last year's report. He is also giving attention to the production of new varieties by artificial pollination.

A. E. SHERRINGTON, WALKERTON, BRUCE COUNTY.

August 27th, 1895. Short distance from G. T. R. station, outside town limits, on land 160 feet above the town. Farm of seven acres, but expects to buy more. Soil, chiefly clay loam and uniform. Most of the farm planted with apples and plums. Has about 240 apple trees in bearing—seven or eight of the leading varieties. Some of the newer varieties top-grafted. Plums, about forty-five trees, about twelve varieties. Pears, about thirty-five trees, mostly Bartlett, Flemish Beauty and Duchess. About half an acre in strawberries and raspberries.

Mr. Sherrington is an intelligent, progressive man, and being an apple buyer, is well acquainted with the fruit interests of his section. He says that in 1893 about 40,000 barrels of apples were shipped out of that section.

He has also a large apiary, managed according to modern methods.

A. W. PEART, B.A., BURLINGTON, HALTON COUNTY.

August 31st, 1895. Farm about one and one-quarter miles east of Burlington station and one and one-half miles from lake shore; 150 acres of land, twenty of which are in fruit. Soil, variable, from a gravel to a clay loam. There are under cultivation the following fruits:

Apples, ten acres; 400 trees, twenty-eight varieties, mostly in bearing; pears, 300 trees, about eight varieties; young trees coming into bearing; grapes, three acres, twenty-two varieties, just in bearing; peaches, fifty trees, three varieties; plums, six acres, twenty varieties, young or coming into bearing; currants, one acre, six or eight varieties. Other small fruits grown for home use.

The whole farm and all the fruits are under first-class cultivation.

Mr. Peart has been spraying for the past ten years, and his trees and vines were nearly all well loaded with a fine crop of fruit.

Personally Mr. Peart is a man of exceptional qualities. He is a graduate of Toronto University, and is a progressive and very energetic fruit grower. He is a careful observer and an exact experimenter on his own account. He is public spirited and posted in the fruit interests of his locality. He is at present Secretary of the Burlington Horticultural Society, which he helped to organize, and president of the county farmers' institute.

The Burlington district is one of the leading fruit districts of the province, and has carried off the prize for district exhibition at Toronto for a number of years. At the time of the World's Fair at Chicago, this district contributed largely to the grand display of fruit made by Ontario. The fruit sent from Burlington to Chicago was gathered and shipped at the expense of the local Horticultural Society.

R. L. HUGGARD, WHITBY, ONTARIO COUNTY.

Sept. 3rd, 1895. Farm about half way between the town and G. T. R. station. Property in two blocks of ten and twenty-five acres, some distance apart. The ten-acre block is all in fruit, and he expects to buy more land adjoining. Soil, clay loam, uniform and well drained. The following fruits are being grown: Apples, about 100 trees in bearing

and a number of young trees coming on. About forty-five varieties, generally two trees of each variety. Pears, about 400 trees, mostly six years old and coming into bearing, others newly planted. About fifty varieties. Plums, about 300 trees coming into bearing. About fifty varieties. Grapes, about thirty varieties, one or two vines of each. Not profitable in this section. A few small fruits, as currants, raspberries, etc.

Orchard under fair cultivation and well sprayed with Bordeaux mixture and kerosene emulsion. Some trees top-grafted.

Mr. Huggard is of about middle age, enthusiastic in fruit growing, intelligent and energetic. Has acted as agent for Messrs. Stone & Wellington.

E. W. BEMAN, NEWCASTLE, DURHAM COUNTY.

Sept. 3, 1895. Farm one and a half miles west of Newcastle and three miles east of Bowmanville. Sixty-eight acres of land, bordering on the lake, about twenty acres in fruit. Soil, a rather heavy clay loam, draining towards the lake. The specialty at this place is pears. Of these Mr. Beman has about thirteen acres, mostly in bearing. He has some of the largest pear trees to be found in the country. Some old Flemish Beauty trees will yield this year six or eight barrels. He had growing at one time nearly 250 varieties of pears, but many of these blighted, and he has now about 150 varieties, and generally three or more trees of each variety.

Apples, about thirty varieties; 150 old trees and about 270 younger trees coming into bearing, many of them top-grafted with new varieties. Plums, about 200 trees, newly planted. Fifty varieties. Grapes do not succeed well here, but he has about thirty varieties, two vines of each.

Small fruits only for home use.

Mr. Beman is a man about sixty years of age. A very careful, thorough and painstaking fruit grower, well read and posted in the fruit interest generally. Has been spraying for the past ten years. The effect of spraying was very marked on his large Flemish Beauty trees. Sprayed trees were loaded and perfectly clean. On an unsprayed tree close by the fruit was cracked and covered with scab.

His younger orchards Mr. Beman keeps well cultivated, but his older pear trees are kept in sod to avoid blight. The grass is mowed and left as a mulch, and ground manured as well. Nearly all of his trees were loaded with fruit, which he grades properly and ships to Montreal in barrels.

HAROLD JONES, MAITLAND, GRENVILLE COUNTY.

Sept. 5th, 1895. Lives two miles from Maitland, seven miles east of Brockville and five miles west of Prescott. Farm consists of 265 acres, bordering on the St. Lawrence. Soil, clay and clay loam, best along the river front, somewhat rocky at the back of the place.

Mr. Jones has about six acres of apple orchard, four acres of trees thirteen years old, nicely in bearing. Had 400 barrels from them last year. Two acres of old orchard, rather rough. One hundred and seventy-five new trees put out last year. Altogether about fifteen varieties; the greater portion of the trees are, however, Fameuse. Bearing orchard is kept in sod and manured heavily. Has been spraying carefully with Bordeaux mixture.

Mr. Jones is about thirty-five years of age, intelligent and enthusiastic in fruit growing. Visits Mr. Craig, of Ottawa, every year, and keeps posted as to insect enemies, etc. Is fighting the Case-Bearer in his orchard under the direction of Mr. Fletcher. He is public spirited and holds office in a number of benevolent societies.

NOTES.

The second attack of mildew was very severe, and though the spray-pump was kept going, considerable damage was done to the young growth of wood and foliage. It is this second or fall growth of this fungus that produces winter spores. These survive the winter and this is why spraying before the leaves open in spring is so important. During this attack I was able to observe the effects of shade upon the growth of this fungus.

A row of nursery stock to the north of a high board fence so situated that the sun did not reach them till late in the afternoon suffered most severely, while opposite a door in this fence and when the rows extended past the fence, the same varieties were not nearly so much damaged. A row of bushes to the east of a dense windbreak of spruce also suffered severely, so did a row on the west side of a tight fence. This demonstrates that shade at the expense of a free circulation of air is not desirable for gooseberries.

Champion, (Eng.), Carnie's Golden, (Scotch), Crosby's Seedling, (apparently of foreign origin), Large Golden Prolific and White Crystal all planted this spring are apparently very vigorous and therefore promising. Time is needful to fully determine their character. Columbus, Golden Prolific and Rumbullion made such poor growth that very little can be reported concerning them.

Next summer I purpose spraying two each with Bordeaux mixture and flower of sulphur while two shall be left unsprayed, also to test the effect of shade with a free circulation of air.

Confusion is likely to arise from the fact that some of our American seedlings are named for existing English varieties, Champion and Red Jacket for example.

It is a pity that originators of new varieties do not consult some list of existing varieties before naming their seedlings. I think it will pay them to do so for a bad name is sometimes fatal.

WEIGHTS OF GOOSEBERRIES.

I have carefully weighed some of the leading varieties and give weights :

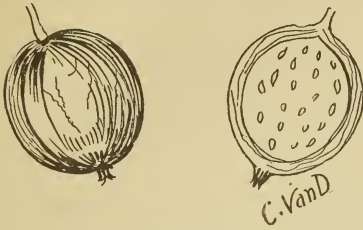
- Downing—12 berries weighed $1\frac{1}{2}$ oz.
- Pearl—12 berries weighed $1\frac{3}{4}$ oz.
- Champion—12 berries weighed $1\frac{2}{3}$ oz.
- Triumph—12 berries weighed $2\frac{3}{4}$ oz.
- Autocrat—12 berries weighed $2\frac{2}{3}$ oz.
- Whitesmith—12 berries weighed $2\frac{3}{4}$ oz.

I should like to get correct names for seed pulp, also for a more solid substance lying between this seed-pulp and skin proper. This substance remains quite firm till the berry is ripe, when it becomes quite soft and sweet. I am of the opinion the nearer we come to the native seedling or wild variety the thinner this is. Cultivation thickens it and lessens the size of the seed cell.

THE LEADING VARIETIES.

An insect, probably the Gooseberry Midge (*Cecidomyia Grossulariæ*) has been more destructive this year, than usual. This insect deposits an egg in the berry which produces a small maggot, causing a premature ripening and falling of the fruit. Its depredations are confined to the so-called thinner skinned varieties, such as Downing, Pearl and Champion. The reason seems to be that the improved or English varieties have a smaller seed cell in proportion to the size of berry. This is especially true of the Triumph, which has only from fifteen to twenty seeds, while the Downing has from thirty-three to forty. The slender white fibres attaching the seeds to the two main veins at the sides of the berry are longer in the Downing, etc., throwing the seeds and seed pulp nearer the surface than in the English varieties. This part of the berry

between the seed pulp and the skin proper, which can easily be peeled off, is more solid and firm than the seed pulp and obviously offers a greater obstacle to the operations of the insect.



DOWNING.

Downing. It would, no doubt, seem to fruit-growers almost superfluous to give any lengthened description of Downing, but I find many would-be planters who know nothing about it nor any other variety. Bush strong, upright grower; stems very strong and armed with strong thorns, abundant at the base of the stem; peduncles slender; pedicle long and strong, one to two berries to each; berries smooth, greenish-white, roundish-oval or nearly globular; fine flavor; prolific, yielding for nine consecutive years five quarts to the bush. This year about

half an average crop. Mildew proof. Any man who will produce as good an all-round berry as the Downing or Pearl, mildew proof, and which shall average one inch by three-quarters, or what will be equal to this measurement, shall deserve the gratitude of the nation.

Pearl. The Pearl, described by some experimenters as of foreign origin and requiring spraying for fungi to succeed, is, no doubt, as the Downing is, a cross of a native seedling upon some English variety, as is claimed for the Pearl by its originator



CHAMPION.

I find it for four years perfectly mildew proof. The description given of Downing is generally applicable to the Pearl with the difference that the latter is a little larger berry and the bush a more vigorous grower. Indeed no other variety equals it in this respect except Champion and probably Red Jacket.

Champion. Champion in several features resembles the Houghton, this is especially the case in stem, shape of berry and frequently having three berries to one peduncle. The berries are also slightly pubescent. This berry is said to be a cross of Downing on a wild Rocky Mountain berry, probably of the species *Hirtellum*.

Bush an upright, vigorous grower, but becomes drooping with the weight of fruit; stems slender and long, smooth; axillary spines long, slender and weak; peduncles slender, having from one to three berries to each peduncle, very short and slender; berries slightly pubescent; color greenish white; oval, skin very thin; seeds from twenty-five to thirty; flavor not so good as Downing; very prolific, apparently mildew proof.



TRIUMPH.

Triumph. Triumph is certainly of English parentage, planted in the fall of 1893. Bush an upright grower, fairly vigorous; stems medium length, stout, armed with long, sharp, strong thorns at the axils; generally three in number; berry smooth, oval, thin skin; very small seed cell containing from 15 to 22 seeds; color greenish-yellow; flavor good, apparently prolific; where spraying is practiced it is valuable.

Autocrat or *Conn*, planted in 1890, shows plainly its European blood. Stems very strong, long, with a pendant habit of growth; vigorous, not very prolific; berry smooth, oblong, dark green; seed cells small, but not so small as Triumph. Taken altogether not very valuable, but worthy of further trial; not disposed to mildew, except occasionally; flavor good; season late, seeds too green to be counted.

Chautauqua and *Queen*. These two varieties, planted in 1893, resemble in wood, leaf, habit

of growth, color, and appearance of fruit the Triumph. That they are wholly or partially of English origin is more than probable.

Lancashire Lad, planted in fall, 1892, but has been moved once. Slow grower of very crooked wood. Berry decidedly pubescent; dark red, oval; like all the English varieties peduncle short; pedicle short and stout; flavor very good. We need a red berry larger than Houghton, but I fear that this berry will never supply this need.

Red Jacket is apparently what is claimed for it, a native seedling (*Cynosbati*). Bush vigorous, rather sprawling grower, somewhat resembling Smith's Improved; berry smooth, rather thick skin, color red, flavor good. Planted fall of 1893. I have strong hopes that this variety will fill a long felt need—a large, red berry combined with great vigor and productiveness.

Whitesmith, a well known and valuable English variety. Bush an upright, vigorous grower; berry smooth, whitish-yellow, oblong, fine flavor, prolific. Must be sprayed for mildew.

Permit me to explain my inability to give pounds per bush this year. Last summer, before I knew of undertaking experimental work, my bushes were all mounded up for the purpose of growing nursery stock, and this spring were torn to pieces pretty severely, so that there was not the necessary amount of wood to grow fruit on, but though I shall continue this work in the future I shall stake off six bushes of every variety to experiment with. The weight of fruit per bush is not always a certain test of extraordinary productiveness. I saw seven quarts picked from a single bush and other bushes in the garden that might give ten quarts, but the bushes had been suffered to grow to an enormous size, and needed pruning badly, and the fruit was very small for the variety.

My method of pruning is at present, until I get more light to have about six stems, sometimes less; these are cut away and their places supplied with new wood at the end of three good crops from the old. The bush is kept well cleared out beneath and the body so pruned out that the hand can be inserted in all directions. At first I cut out the centre of the bush, keeping the centre like a vase or inverted umbrella, but I found the



WHITESMITH.

fruit scalded badly, I may add that in comparatively low growing varieties I find it better not to cut back the new wood too much as it induces a great growth of small, weak wood, which is not desirable. I am of the opinion that summer pruning would be an advantage the cutting out of all superabundant new growth at this season would induce the stronger growth of the remainder. I cannot see why the wood should be allowed to ripen before being pruned out.

STANLEY SPILLEIT,
Experimenter.

STRAWBERRIES.

SIMCOE EXPERIMENT STATION.

This is a year of disappointment and failure for the strawberry grower. The plants wintered well and made a remarkable growth during the warm, unseasonable weather of the first part of May. The first blossoms were opening and the fruit stems were well filled, when the weather suddenly changed and for several nights we had from six to eight degrees of frost followed by cold winds and bright sunshine during the day. This was varied on one day by a fall of snow. The apple and pear trees were white with bloom, and we had a spectacle never before seen in my recollection—the trees laden with snow and white with bloom at the same time. The effect on the strawberries was most disastrous. Not only the blossoms, but the leaves, were frozen. On opening the petals of the undeveloped blossoms it was found that every blossom on the fruit spurs was frozen, and the only fruit that could be expected now would be upon the later plants upon which the fruit spurs were not yet developed. With abundant moisture and favourable weather these might have given nearly half a crop, though undersized and inferior. But instead, we have had a severe drought that is not as yet broken at this writing—June 24—and so the strawberry crop of '95 must be classed as almost a total failure.

Under these circumstances it is impossible to make a reliable estimate of the forty varieties under test here, or to give an accurate account of their good or bad qualities,

for the reason that some were more forward than others and thus suffered more from the frost. Then some varieties have a habit of developing their blossoms nearly together, while others continue to develop blossoms for a much longer period, and in this way were not so much injured. For instance, the blossoms on Gov. Hoard, Grenville, Seneca Queen and Timbrell were so entirely frozen off that I could not get a specimen of the fruit.

However I have endeavoured to make a few notes on the different varieties, so far as I am able to judge of their merits, with one season's trial under very unfavorable conditions.

NOTES ON VARIETIES.

Parker Earle (S). One of the most promising of the new sorts. Foliage, moderately healthy, a little affected with rust; fruit stalk, long; form, oblong; color, red; quality, medium; berry, firm, would be a good shipper; season, medium. With rich soil and high culture this berry would be very productive. For the commercial grower it is no doubt an acquisition.

Beder Wood (S). Vigor, medium; foliage, healthy; stalk, long; color, pale red; size, medium to large; quality, good; productiveness, medium; firm enough to ship well. Said to be early, but no earlier than many other varieties here.

Woolverton (S). This variety has not nearly fulfilled my expectations. The blossoms are rich in pollen. It is therefore a good fertilizing sort to plant with pistillates, but many of the plants do not bear the first year after planting. It is a poor bearer. Berry, large, oblong, bright red, moderately firm; stalk, long; quality, good; foliage, very healthy; season, medium; needs further trial.

Saunders (S). This variety did not make many plants, and many of those planted failed, so that there were few left. Under these conditions I would not say much about it until given another year's trial. Berry, large, bright red, conical; quality, excellent; foliage, very healthy; stalk, medium; worthy of trial.

Little's 44 (P). Berry, fine, handsome, large; quality, good; firm enough for local market; fruit stalk, long; foliage, very healthy; not productive enough for the commercial grower.

Leader (S). Berry, medium to large; form, round, often flat; quality, good; stalk, medium; foliage, healthy; a medium bearer; needs further trial before recommending it for general planting.

General Putman (P). Berry, large; color, light pale red; quality, good; stalk, long; foliage, medium; not productive; needs further trial.

Woodruff (S). Berry, medium; color, red; firm enough to ship fairly well; stalk, medium; foliage, medium; promises, under favorable circumstances, to produce a fair crop.

Lovett (S). Berry, medium to large; color, bright red; form, oblong; quality, good; firm enough to ship; plants vigorous with healthy foliage; fruit stalk, long; not productive.

Cameronian (S). A large dark red berry; firm enough to be a good shipper, but of poor quality and lacks productiveness.

Moore's Early.—Only succeeded in growing one of two plants of this variety. It is a bright, attractive berry of good quality, but no earlier than Crescent. Berry, firm, round, a little flattened at the tip; bright, attractive color; quality, good; cannot judge of its bearing qualities.

Bubach No. 2 (P). Berry, large; form, irregular; moderately firm; quality, good; productiveness, medium; fruit stalk, short; foliage, very healthy; a good standard sort, and should have a place in every plantation.

Lady Rusk (P). A promising variety. Berry, medium; quality, fair; form, somewhat conical, though often irregular; stalk, medium; in firmness will compare well with

many other varieties and promises to produce well ; holds its fruit well through the season and seems to stand dry weather better than many other sorts ; foliage, healthy ; a good grower.

Hatfield (P). A large, handsome berry ; only one or two plants lived ; needs further trial.

Edgar Queen (P). Berry, medium to large ; quality, fair ; color, red, handsome ; firm ; fruit stalk, long ; a promising variety.

Captain Jack (S). Berry, firm ; color, bright red ; quality, medium ; form, conical, resembles the *Wilson* in shape ; fruit stalk, long ; plants vigorous, but inclined to rust badly later in the season ; productiveness, only medium ; needs another season's trial.

Some of the plants sent here were wrongly named. Care should be taken to avoid this, as it is sure to cause confusion. One or two varieties seem to be *Crescent* under other names ; one lot labelled *Wilson* turned out to be *Crescent*. I received the *Hatfield* from two places, and they were different varieties. The one I have sketched is a large berry, with very healthy foliage. The other is a small berry, of poorer quality, a good grower, but the foliage is a little inclined to rust ; a great bearer. The fruit somewhat resembles *Crescent*, but not so large. If the fruit were large, it would be a decided acquisition, as it bids fair to outstrip all others in yield. It is a pistillate variety.

Haverland (P). A rampant grower ; healthy foliage ; productive ; withstands drouth better than any other variety ; one of the best. Its only fault is that it is too soft when fully ripe to ship well. Everyone who plants for home use should have this variety. Excellent for dessert.

Miami and *Martha* are very much alike ; very prolific but too small.

Great Pacific and *Shaw*. Only one or two plants of each of these pulled through. Will have to give them further trial.

Daisy is a medium sized berry, smooth, round and handsome, with healthy foliage. If, on further trial, it produces well, it will be well worthy of cultivation.

Mrs. Cleveland is a rampant grower with healthy foliage, but the berry is too soft for anything except home use. It is a poor bearer, and may be regarded as a failure. I would not recommend it.

Governor Hoard, *Seneca Queen*, *Middlefield*, *Timbrell*, *Advocate*, *Auburn*, *Florence* and *Eureka* have nothing so far to recommend them. They will have another season's trial, however, before being placed on the rejected list. *Greenville* is little better. *Swindle* is appropriately named ; it is simply no use.

There are none among the new varieties tested that equal *Crescent* for yield, except perhaps *Parker Earle*. The latter is decidedly a better shipper. *Haverland*, though rather soft for long distance shipments, is one of the best for health and vigor of plant.

From my experience so far, if the old *Wilson* could be grown as it used to grow here, and we could prevent the rust by spraying, I would not discard it for any other, as it is certainly without a rival as a shipping berry.

We cannot go far astray in planting for profit *Crescent* and *Haverland*, with *Parker Earle* as a pollenizer. These three varieties would no doubt fill the bill. For the home garden, *Crescent*, *Haverland*, *Bubach*, *Saunders*, *Sharpless* (the latter only where the soil is very strong and rich), and for a sixth, *Daisy* or *Woodruff*. These would be a good selection for canning and dessert.

I must again repeat what I have already said, that the testing of the varieties having been made under such disadvantageous conditions this year, nothing conclusive can be stated against or in favor of most of the varieties mentioned. Another year's trial may develop qualities in many of these varieties not now apparent. I propose to try the effect of *Bordeaux* mixture in preventing rust, blight, etc., as soon as fruiting is over.

STRAWBERRIES—

Fruit Stalk : Long or Short ; above foliage or concealed by it.

Size : S, Small ; M, Medium ; L, Large ; Add average length and breadth in inches.

Form : B, Broad ; C, Conical ; D, Depressed ; I, Irregular ; L, Long ; O, Ovate ; R, Round.

Number.	Varieties.	Sex.	Plant.		
			Origin.	Foliage. Healthy or liable to rust.	Fruit stalk.
1	Aroma	S	Seedling of Cumberland, Kansas	very healthy	M to L
2	Arrow	P	From Haverland, Wisconsin	healthy	L
3	Afton	P	Chance seedling, New York	healthy	M
4	America	S	From Great American, Virginia	healthy	L
5	Barton's Eclipse	P	From Longfellow, Kentucky	some rust	M
6	Beverly	S	From Miner's Prolific, Mass.	healthy	M to L
7	Bubach	P	Mr. J. G. Bubach, Ill.	very healthy	M
8	Bederwood	S	Mr. B. Wood, Ill.	some rust	M to L
9	Boynton	P	From Crescent x Sharpless, New York	healthy	M
10	Briggs	S	From Chas. Downing, Rhode Island	some rust	M to S
11	Bisel	P	From Wilson, Illinois	some rust	M
12	Brandywine	S	From Glendale & Cumberland, Pa.	healthy	M
13	Belle	S	Mr. Thompson, Va.	very healthy	M
14	Beede's No. 1	S	G. F. Beede, N.H.	very healthy	M
15	Beauty	S	Unknown	very healthy	M to L
16	Clyde	S	Seedling of Cyclone, Dr. Stayman, Kansas	very healthy	M to L
17	Cyclone	S	Seedling of Crescent, Mr. Cruse, Kansas	very healthy	L
18	Cruse's No. 9	S	Seedling of Cumberland, Mr. Cruse, Kansas	healthy	M to L
19	Chairs	P	From Bubach & Sharpless, Maryland	healthy	M
20	Charlie	P	From mixed seed, Mr. Thompson, Va.	healthy	M to L
21	Dr. Arp	P	Mr. Stone, Ill.	healthy	M to L
22	Della K	S	Seedling, Sharpless, E. B. Stevenson, Canada	healthy	M
23	Enhance	S	From Windsor Chief and Sharpless, Mr. Young, Ohio.	healthy	M
24	Edgar Queen	P	Mr. B. O. Curtis, Illinois	some rust	M
25	Epping	P	By Geo. D. Dow, N.H.	very healthy	M
26	Effie May	S	Unknown	very healthy	M
27	Edith	P	Chance seedling, by Mr. Thompson, Va.	some rust, healthy	M
28	Equinox	S	Seedling, Mt. Vernon, Mr. Thompson, Va.	some rust, healthy	L
29	Fremont	S	Seedling of Belmont, G. F. Beede, N.H.	some rust, healthy	M to L
30	Gandy	S	Cross of Jersey Queen with Glendale	healthy	M to L
31	Greenville	P	Chance seedling, by Mr. Buechly, Ohio.	very healthy	S to M
32	Glennfield	S	From Warfield & Glendale, by Dr. Stayman, Kansas.	healthy	M to L
33	Gov. Hoard	S	By F. W. Loudon, Wis.	healthy	M to L
34	Gertrude	S	Chance seedling, C. C. Stone, Ill.	healthy	S to M
35	Gandy Belle	S	Unknown	healthy	M
36	Haverland	P	Mr. Haverland, Ohio	very healthy	L
37	Howard's No. 25	S	From Haverland & Belmont, Mr. Howard, Mass.	some rust, healthy	M
38	Howard's No. 41	P	From Haverland & Belmont, Mr. Howard, Mass.	healthy	M to L
39	Hatch Ex. Stn. No. 24	S	From Hatch Ex. Station, Mass.	healthy	S to M
40	Hunt's No. 3	S	Mr. Hunt, N.J.	very healthy	M
41	Huntsman	P	Mr. Huntsman, Mo.	some rust, healthy	S to M
42	Hanson	S	Mr. Stone, Ill.	some rust, healthy	M
43	Hiawatha	S	From Aroma, by Dr. Stayman, Kan.	very healthy	S to M
44	Iowa Beauty	S	Mr. C. P. Walworth, Iowa	healthy	M
45	Ivanhoe	S	Seedling of Prince of Berries, by G. W. Trowbridge, Ohio.	healthy	M
46	Jucunda Improved	P	From Old Jucunda, by A. B. Gerbert, Pa.	some rust, healthy	S to M
47	Jersey Queen	S	Unknown	very healthy	S

BY E. B. STEVENSON, FREEMAN, ONT.

Color : B, Bright ; C, Crimson ; D, Dark ; L, Light ; R, Red ; S, Scarlet.
 Flesh : F, Firm ; S, Soft,
 Season : E, Early ; M, Medium L, Late.

Number.	Plant.		Berry.					Value. Scale 1-10.		Remarks.	
	Vigor. Scale 1-10.	Productiveness. Scale 1-10.	Size.	Form.	Color.	Flesh.	Flavor (See Thomas.)	Season.	Dessert.		Market.
1	8	8	L					L	8	9	A good one.
2	8	6	M to L					M	7	7	Not as good as Haverland.
3	10	9	M					M	6	8	Very like Warfield.
4	5	8	M					EM	9	8	Further trial.
5	8	6	M to L					M	7	7	Worth trying.
6	7	7	L					M to L	8	9	Does well in some parts.
7	7	9	L					M	8	10	One of best.
8	7	9	M					E	6	9	Near.
9	9	9	M to S					E to M	6	7	Distant, a good early.
10	4	6	L					M	8	8	Same as Crescent.
11	8	9	M to L					M	8	8	Can't stand hot, dry weather.
12	9	8	M to L					M	8	9	A good market sort.
13	8	7	L					M to E	9	9	Worth trial.
14	8	6	M					L	8	8	A fine one.
15	8	8	M to L					M	10	8	Further trial.
16	10	10	M to L	RC	BS	VF	good	M	7	7	Worth a trial.
17	9	8	M	C	S	F	good	E	8	10	One of the best market ones.
18	8	7	L	R	R	F	good	L	8	8	A good one.
19	7	8	M			Soft	good	E to M	8	7	Another trial.
20	8	7	M					M	8	5	Of little value.
21	7	6	M					M	6	6	Further trial.
22	8	9	L	C	S			M to L	6	6	Of little value.
23	9	8	L			VF		M to L	8	9	Further trial.
24	7	5	M			VF		M to L	6	9	A good one for market, firm.
25	8	7	M					M	7	6	Not much good.
26	8	6	M					M	6	8	Further trial.
27	8	8	VL		R	S to M	fair	M to E	7	8	Further trial.
28	8	9	M to L				very good	VL	7	7	Very large berries, somewhat soft.
29	8	8	M					M	9	8	Further trial.
30	8	6	L					L	8	8	Will give another trial.
31	9	10	L		BR	M	good	M	8	8	Shy bearer but good.
32	7	6	M		DC	F	very fine.	M	8	10	Near.
33	8	6	L			F	good	M to L	9	6	Distant, one of best.
34	8	8	M			M	fair	E to M	6	8	Fine quality.
35	8	7	L			F	good	E to M	8	7	Shy bearer, good quality.
36	9	10	L				good	E	6	7	Further trial, worth trying.
37	9	6	L				good	M	8	8	Another trial.
38	8	7	L		BC	M	good	E to M	10	8	Near.
39	7	6	L		DR	S to M	fair	M	7	6	Distant, one of best.
40	9	8	M to L			F	good	M	7	7	Further trial.
41	8	7	L		DC	M to S	m to good	M	8	8	A good one.
42	6	6	M				medium.	M	8	8	Another trial.
43	10	7	M				medium.	M	6	6	Not valuable.
44	8	8	L		DS		very good	M	7	7	A good one.
45	7	7	M		BR		good	M to L	10	8	Fine home berry.
46	8	7	L		BS	F	good	M	6	7	Amateur's berry.
47	8	8	L		BS	M	good	VL	9	9	Not productive enough.
									8	9	One of best late sorts.

STRAWBERRIES.

Number.	Varieties.	Plant.			
		Sex.	Origin.	Foliage. Healthy or liable to rust.	Fruit stalk.
48	Judsonia	S	Unknown	some rust, healthy .	M
49	Jarabolo	S	Seedling of Mrs. Cleveland, by Dr. Stayman. Kansas	healthy	M
50	Klickita	P	Chance seedling, by E. W. Cone, Wis	some rust	M
51	Kansas Prolific	S	Seedling of Warfield, Dr. Stayman, Kansas	very healthy	S to M
52	Leader	S	By late J. B. Campbell, Mass	healthy	M to L
53	Longfield	P	Seedling of Warfield, Dr. Stayman, Kansas	very healthy	M to L
54	Lovett's	S	From Crescent & Wilson, J. H. Norris, Ky.	some rust, healthy .	M to L
55	Magnate	P	From Warfield, by Dr. Stayman,	healthy	M
56	Maple Bank	P	Seedling of Wilson, parentage by Mr. Stevenson, Ont.	some rust, healthy .	M
57	Michel's Early	S	Chance seedling, thought from Crescent, by J. G. Michel, Ark	healthy	S to M
58	Meek's Early	S	Mr. J. A. Meek, Ind	healthy	M
59	Muskingum	S	Mr. G. Kearns, Ohio	healthy	L
60	Mary	P	From Windsor Chief, by H. H. Alley, N. J.	healthy	M to L
61	Margaret	P	Seedling of Crawford by Mr. Crawford, Ohio	healthy	M
62	Marshall	S	Chance seedling, Mr. Ewell, Mass	some rust, healthy .	M to L
63	No Name	S	Unknown	healthy	M
64	Northern	S	Unknown	very healthy	S to M
65	Ohio Centennial	P	Unknown	healthy	S
66	Oberholtzer's No. 3	P	Mr. Oberholtzer, Ohio	healthy	M
67	Ona	P	From Crescent x Sharpless, Mr. Kilbourne, Minn	some rust, healthy .	M
68	Parker Earle	S	From Crescent x Munson's No. 8, Mr. Nimom, Texas	some rust	M to S
69	Phillips	S	From Crescent x Sharpless	some rust but healthy	S to M
70	Princess	P	By Mr. J. C. Kramer, Minn	healthy	M
71	Prince of Berries	P	From Jersey Queen	healthy	L
72	Princeton Chief	P	Unknown by Mr. Pascharsky, Ill.	some rust, healthy .	L
73	Plow City	S	Seedling of Sharpless, C. C. Stone, Ill.	healthy	M to L
74	Robinson	S	From Crescent x Chas. Downing by J. G. Robinson, Kansas	healthy	M to L
75	Rio	S	Seedling of Sharpless by Mr. Thompson, Va	healthy	S to M
76	Richmond	S	Mr. Thompson, Ohio	healthy	M
77	Southard	S	Chance seedling by Mr. Southard, Ohio	healthy	M
78	Saunders	S	By Mr. Little, Ont	some rust, healthy	M
79	Sunnyside	P	By Mr. C. S. Pratt, Mass	healthy	M
80	Snowball	S	By Mr. Cone, Wis	almost burnt up with rust	M to L
81	Scarlet ball	S	By Mr. Cone, Wis	healthy	M to L
82	Splendid	S	By Mr. C. H. Summer, Ill	very healthy	M
83	Stone's Early	P	By Mr. Stone, Ill	healthy	M to L
84	Springdale	S	Seedling of Aroma by Dr. Stayman, Ka	very healthy	M to L
85	Tennessee Prolific	S	From Crescent x Sharpless by J. C. Hodges, Tenn	very healthy	M
86	Timbrell	P	Chance seedling by H. S. Timbrell, N. Y.	healthy	M
87	Van Deman	S	From Crescent x Capt. Jack by J. C. Bauer, Ark	some rust, healthy	M
88	Warfield	P	From Crescent x Wilson, B. C. Warfield, Ill	healthy	M to L
89	Williams	S	Seedling of Sharpless from Ont.	some rust, healthy	S to M
90	Woolverton	S	Mr. J. Little, Ont	healthy	M to L

—Concluded.

Number.	Plant.		Berry.						with Value. Scale 1-10.		Remarks.
	Vigor. Scale 1-10.	Productiveness. Scale 1-10.	Size.	Form.	Color.	Flesh.	Flavor. (See Thomas.)	Season.	Dessert.	Market.	
48	7	7	M to L	.....	C	M	good	M	7	7	Further trial.
49	8	7	L	.....	.....	M	good	M	8	8	Worth a trial.
50	8	6	M to L	.....	DS	F	good	M	6	6	Not much value.
51	9	7	M	.....	DR	M to S	good	E to M	7	8	Worthy of trial.
52	5	5	L	.....	DR	F	very good	E	10	7	Further trial.
53	9	9	M to L	LC	.....	F	medium..	L	7	9	A good one.
54	9	8	M to L	.....	DC	F	medium..	M	6	8	Only medium.
55	8	6	M to L	LC	BS	F	very good	M	9	8	Worth a trial.
56	9	8	L	RC	.....	VF	good	M to L	9	8	A good one.
57	10	4	S	R	LS	M	medium..	E	6	8	Hardly worth growing.
58	8	4	M	.....	.....	M	medium..	E	6	8	Worthy of a trial.
59	8	7	L	.....	DR	M	good	M to L	8	6	Good one.
60	8	9	L	.....	BR	F	fair	M	7	9	One of the best, 1 year's trial.
61	8	7	L	R	BR	M	good	E	7	8	Further trial.
62	8	6	V L	.....	.....	F	good	M	8	7	Fine amateur berry.
63	8	7	L	.....	.....	F	good	E to M	8	8	Worth trying.
64	7	6	S	.....	.....	.....	good	E	8	6	Not valuable.
65	6	8	V L	.....	.....	M	good	M to L	9	6	A good one.
66	8	7	M to L	RC	BC	F	good	M	8	8	Worth a trial.
67	7	6	M to L	.....	BS	F	fair	E	6	6	Not worth much.
68	5	9	S	C	S	F	medium..	M to L	7	8	Hardly worth a trial.
69	9	7	L	RC	DR	F	medium..	M	7	6	Valuable.
70	7	6	M to L	R	S	F	good	M	6	7	A good one.
71	8	8	M to L	.....	.....	M	fair	M	6	8	A good one.
72	8	5	M	R	DR	M	medium..	L	7	7	Not valuable.
73	7	8	M to L	.....	.....	F	fair	L	7	8	Worth a trial.
74	8	8	M	RC	DC	M	good	M	6	8	Worthy of a trial.
75	9	8	M	.....	BR	F	good	E	7	8	A good one.
76	8	7	M	.....	DS	F	medium..	M	7	8	Worthy a trial.
77	8	8	M to L	RC	DS	F	good	M	9	7	A fine one.
78	9	9	L	RC	BC	F	very good	M	9	9	One of the best.
79	8	8	S	C	L	F	medium..	M	7	8	Small, but worth trying.
80	7	4	M	.....	.....	M	.....	M	.....	.....	Not valuable on account of rust
81	8	6	M to L	.....	S	F	good	M	7	8	Further trial.
82	10	6	M	R	.....	M	medium..	M	6	6	Further trial.
83	7	8	S	C	S	M	fine	E	8	6	Worth trying.
84	8	7	M to L	.....	.....	.....	good ....	.....	.....	.....	Further trial.
85	9	9	M to L	.....	.....	M	good	M	8	8	A good one.
86	8	9	L	.....	.....	F	very good	VL	10	8	Well worth trying.
87	10	8	L	C	BC	F	very good	EE	10	9	Best extra early.
88	10	9	M	C	DC	F	good	E to M	7	9	One of best.
89	9	8	L	RC	DC	M	m to poor	M	5	8	Quite productive.
90	9	8	L	RC	DR	F	good	L	9	8	A good one, all should try it.

STRAWBERRY NOTES.

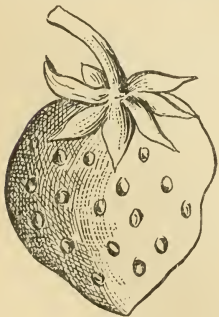
HALTON SUB-STATION.

It is almost impossible to make a report this year. The crop was so badly injured by a week's hard frost at blooming time, and that followed by a long season of hot, dry weather, that it was impossible for any variety to do its best. This fact must be kept in mind in what follows, especially in the illustrations. These are at least one-quarter smaller than they would have been if they had had a good shower during the time they were maturing. The cuts are the exact size of berries that grew on the respective varieties this season of 1895. I shall first present six or eight of the best extra early and early sorts to be followed by eight or ten of the best medium varieties, and lastly by the best late kinds. These are selected out of some 140 of the best named kinds that are now before the public; the simple facts as they presented themselves are given with regard to each kind now offered to the readers of the *Horticulturist*. The Clyde did best of all; Beder Wood came next. Some of the varieties that had the flower stems and flowers frozen, sent up a secondary set, notably the Clyde and B. Wood. Some did not. The Haverland, Bubach and Van Deman were among those hurt the worst and did not recover, only producing a very few berries. What fruit there was, was small and ill-shaped; not typical berries of many of the kinds.

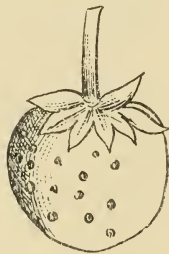
EARLY VARIETIES.

Van Deman (S.) One of the earliest, an extra early, is the Van Deman; a seedling of Crescent crossed with Capt. Jack, and it comes from Arkansas. The plant is a free grower, making a wide matted row, and when allowed to grow too thick rusts somewhat. The season is extra early, a few days before Michel's Early. Size: The fruit is large and very beautiful, a box of them fairly compelling you to look at them. The berries look as if varnished and set with golden seeds. They are a grand sight. One of the good things about them is, the quality is as fine as the look; they are first quality, and firm; and lastly, very productive. The best to fertilize are Haverland, Warfield, Bubach and other early pistillates. The great danger with the Van Deman is it is often caught by the frost it is so early to bloom and fruit. This is the fourth year of fruiting.

Michel's Early (S) A chance seedling thought to be from Crescent by J. T. Michel of Arkansas. The plant is a wonderfully vigorous grower, making plants by the million.



VAN DEMAN



MICHEL'S EARLY.

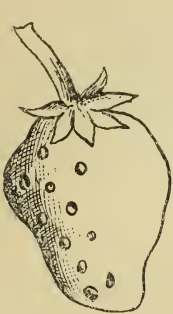


MARGARET.

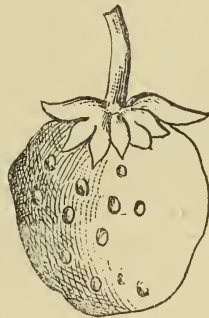
The season is very early, only a few days after the Van Deman. The size of fruit is small to medium; the quality is fair and medium in firmness. The great fault with it is it lacks in productiveness. If you could secure \$1 per box they might pay, and yet in some soils and sections of the country it is said Michel's is more than average in productiveness; but where there is one favourable report there are more than nineteen unfavorable. It is not anything like as profitable as Van Deman or Beder Wood. Fourth year of fruiting.

Margaret (P.) This is a seedling of the Crawford, by Mr. Crawford, the strawberry king of Ohio. The plant is a strong grower, healthy, and making runnets freely. The season is very early. Size of fruit is large and fine looking; quality, good; color, crimson; firmness, medium, and productiveness fair. This was the first season it fruited here, and as it was one of the most unfavorable seasons. I would like to make further trial before pronouncing on it, but it is very promising. It has not been introduced yet.

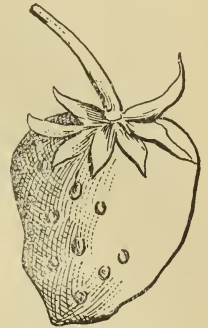
Stone's Early (P.) This is a seedling by Mr. Stone of Illinois. The frost and hot, dry weather succeeding was very hard on this variety. The plant is a healthy one, growing freely; the season is early; the size of the fruit was small this season, but that



STONE'S EARLY.



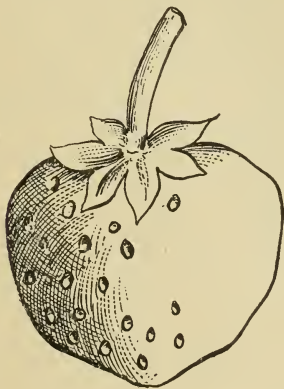
BEDER WOOD OR RECASTER.



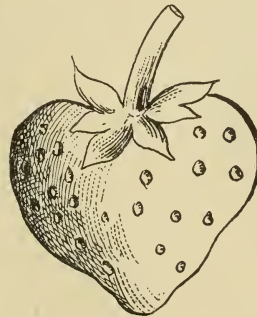
RIO.

may have been owing to the dry spell just as it should have been at its best; the quality is fine; color, scarlet; it was not very productive; this was the first season it fruited here; must wait for further trial before deciding as to its merits.

Beder Wood (S.) or *Recaster*. A seedling by Mr. B. Wood, of Moline, Illinois. The plant is a good grower, making a wide row. It rusts somewhat when too thick. The season is early, among the earliest; the size of berry is medium to large. One fault it has, some of the berries do not ripen evenly, having a white underside. It is very rich in pollen and so a good fertilizer; the quality is only medium; firmness, medium; productiveness very good, in fact it is one of the most productive of all, certainly the most productive early variety. It was among the best this dry year. Fourth year of fruiting.



CLYDE.



CYCLONE.

Rio (S.) This is a seedling of Sharpless, grown by Mr. Thompson, of Virginia. The plant is a good healthy grower, making a good wide row. The season is second early here this year. Size of berry is above medium; bright red color; quality is good; medium in firmness. It is productive. This is first year of trial; must give it further trial; but I am very favorably impressed with it, and think it very promising.

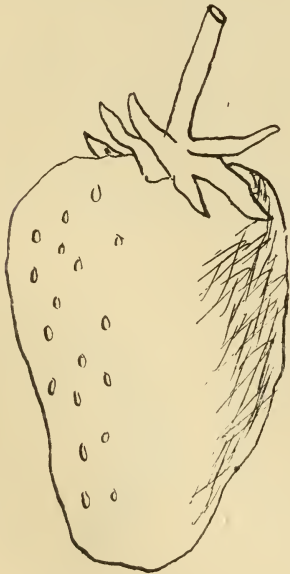
Clyde (S.) This is a seedling of the Cyclone grown by Dr. Stayman, of Kansas. The plant of the Clyde is perfect in every respect; it is very healthy and vigorous, not a spot of rust or trace of disease on it. It resembles its parent and the Haverland, but is stronger and more vigorous than either of them. The season is second early, continuing a long time. Size: it is large, no small berries; quality is good, and it is very firm; a bright dark scarlet in color, and one of the most productive. This season it stood far and away at the head, showing that it is a dry season berry; the strong plant with its roots going down so deeply, enables it to stand a dry time better than many others. I consider it one of the best, if not the best, general purpose berry that is now offered; have fruited it three seasons. I would advise all berry growers to plant some Clyde. The following is Michigan Experiment Station report of it: "Out of ten points: Productiveness, 9.8; quality, 8.5; firmness, 9.2. One of most promising."

Cyclone (S.) This is a seedling of Crescent-Cumberland, grown by Mr. Cruse, of Kansas. The plant is a strong, healthy, vigorous grower; no rust or disease; season, early; size, medium. The quality is good; glossy red; firmness medium, and very productive; a good one to plant with Haverland or Bubach, as it is a very early bloomer and continues a long time in bloom. It does not stand the dry weather as well as the Clyde, nor is the fruit as large; still it is a good one to plant for early.

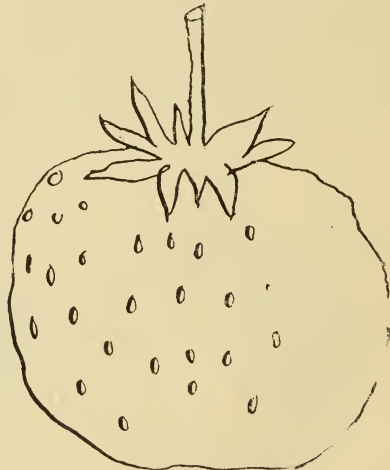
MID-SEASON VARIETIES.

In this paper I will give a list of the best varieties, the fruiting of which will be found to be mid-season.

In making these outlines typical berries are used, not monstrosities, but berries that would give a good idea of the general shape of the variety. I might have got larger specimens of all the varieties, but they would not have been types of the variety.



HAVERLAND.

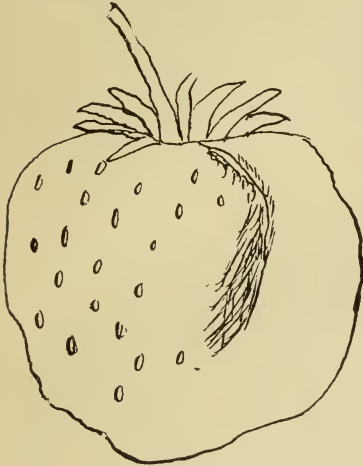


BUBACH 5.

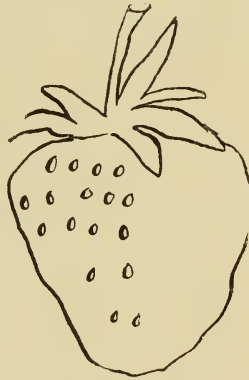
Haverland (P). A variety originating in Ohio. This is one to grow enthusiastic over. It is one of the best, if not the best of all; when one sees the ground covered entirely with fruit, from the first of the season to the very end of it, the originator may well be proud of it. It is magnificent in its foliage; most numerous in number of runners and enormous in quantity of fruit. The fruit is large to very large. Its only fault is that it is somewhat soft; of fair quality. It is certainly a berry for the home garden and near market. Perhaps not suited for long distance shipment. Color, rather

light. As a producer of fine large berries, nothing else with us equals it. It gives large fruit to the end of the season, and is one of the first ripe.

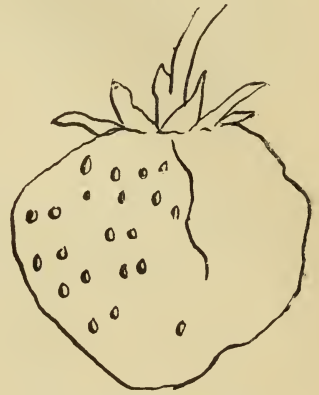
Bubach (P). Originating in Illinois. Here is another grand standby. The foliage is all anyone could wish for, both in thrift and color and health; not a trace of rust; it makes runners fast enough for a grand row to fruit. The fruit is remarkable for its size and fine color. We place it among the productive ones. Fruit enormously large and very showy; good quality; sweet. It is perhaps the very best for the home grower, and near market, always selling and bringing good prices when the market is glutted with Crescent and other trash.



BUBACH 5.

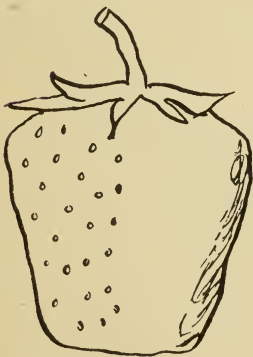


WARFIELD.



ANNA FORREST.

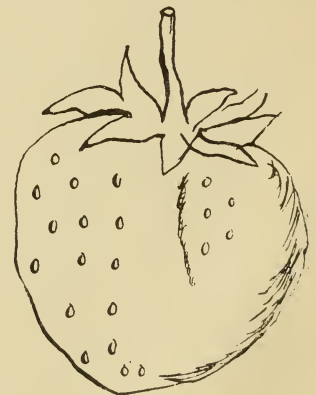
Warfield No. 2 (P). Originated in Illinois. This is a wonderfully strong grower and great producer of plants. It resembles the Michel's Early in this respect, making almost too many runners. It is very productive, we place it along with the Haverland in productiveness. Fruit, medium to large in size, is one of the firmest in the berry—equal to the old Wilson in this respect. Quality good; color, a fine rich dark. The



DAYTON.



PRINCESS.



GREENVILLE.

berries are all perfect in shape, regular, no ill-shaped ones, and of a fine rich, dark color. It is one of the best, if not the best, for long shipment—carrying in good condition the longest distance to market.

Anna Forrest. Foliage, large and healthy. The fruit is large, somewhat irregular; sweet and pleasant. It is a free runner; only moderately productive. The fruit color is up something like Sharpless. Altogether, with us it is now a promising variety, and we have decided to discard it. So many better ones.

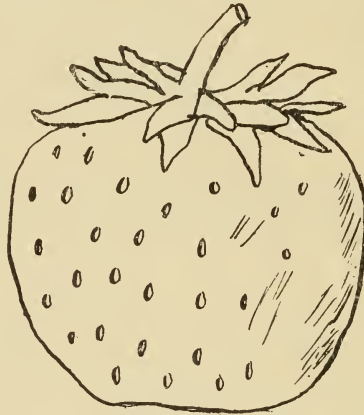
Dayton (S). Originated in Ohio. This is a strong healthy grower, making many runners; plant very healthy. The fruit is large, light in color, not very firm and only moderately productive. We have planted it two seasons, in doubt about it, but have decided to discard it; there are so many better that we have no doubt about.

Princess (P). Originated in Minnesota. This is a good strong grower; plant very healthy and making plenty of runners. The fruit is large in size, good shape, fine to look at, rather soft, not very productive. We are giving it a further trial. There are some parts where it seems to produce large crops of the finest berries.

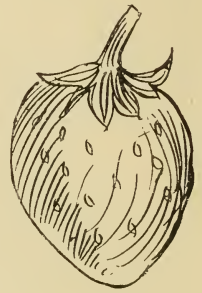
Grenville (P). Originated in Ohio. Here we have another grand berry, about which there is no doubt at all in anyone's mind, but all pronounce it at once of the first class. We place it alongside Bubach, if not in front. It very much resembles Bubach in color of plant, but it is a free grower, making many more plants; it is more productive. The fruit is not quite so large; about the same in firmness. It certainly is one of the best for the home grower or near market. No one can go wrong in planting largely of the Grenville.



MARSHALL.



MAPLE BANK.



LEADER (S).

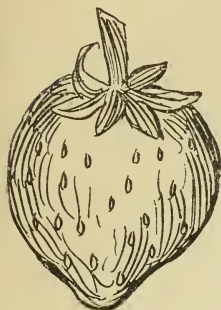
Marshall (S). Originated in Massachusetts. The plant of the Marshall is very large, stools somewhat before sending out runners; rusts somewhat, plant though is vigorous. The fruit is large dark-red, good shape and fine quality; productive. One of the best to grow for show berries. Have fruited it only one season. Will be better able to decide its merits after further trial.

Maple Bank (P). Originated in Ontario. A strong healthy grower, good runner, making wide matted row. The fruit is large, rich, dark crimson and very firm. The shape is good. It is one of the finest and thus should be a good shipper. If it grows to be as good in other places as with us it will take a first place. It is being tested at several places north, south, east and west before being offered to the public.

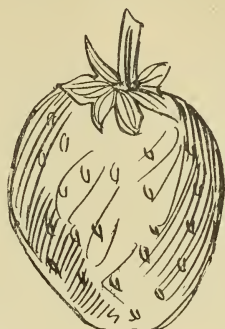
Leader (S). This berry comes from Massachusetts, grown by the late J. C. Campbell. It has done no better here than last year; not a very vigorous grower; some rust; the season is medium; the size this year only medium owing no doubt to the dry weather; quality the very best, and first in firmness; medium in productiveness; it has been very much injured by the frost the past two seasons in blooming time. I shall give it another trial, for I hear many good reports of the Leader. Second year of fruiting.

Saunders (S). This is a Canadian berry, a seedling by Mr. Little, of Ontario. It is a very vigorous grower, makes a wide matted row; it rusts some if allowed to grow too thickly; it is a late bloomer and so often escapes the frost, but it is medium in fruiting; the size of the berry is large; the quality of the fruit is first-class and a firm berry; will carry to distant points and very productive; not as well known as the Williams but

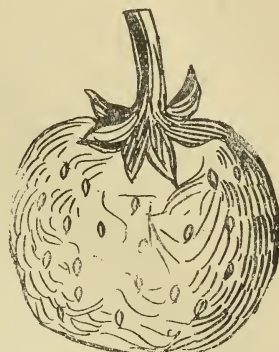
altogether a better sort in every respect ; it is rich in pollen and so a good one to plant with pistillate kinds. It is a beautiful shape and fine color, coloring all over at same time ; it is a grand and beautiful berry. Fifth year of fruiting.



SAUNDERS (S).



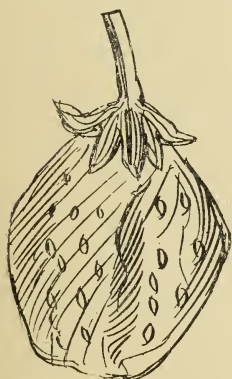
TENNESSEE PROLIFIC (S).



MARY (P).

Tennessee Prolific (S.) This is a seedling of the Crescent and Sharpless, it follows the Crescent in productiveness and the Sharpless in size. The plant is a vigorous, healthy grower, making a fine stand of plants. The season of fruit is early medium ; size, large ; quality, good ; and medium in firmness and very productive. The reports are all good of the Tennessee Prolific, no variety has so soon become popular over such a wide extent. To keep up with the procession of the best varieties a grower must have the Tennessee Prolific. It is a grand staminate. Third year of fruiting.

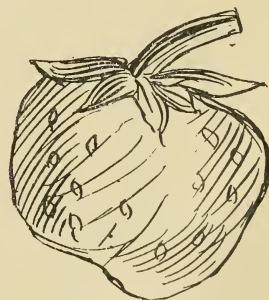
Mary (P.) A seedling of Windsor Chief from New Jersey. The plant is a strong, vigorous grower and quite healthy, the season of fruiting is medium to late, this was one of the least injured by the severe frost last spring at blooming time. The size is of the largest ; the quality fair and firm ; is very productive, one of the most productive on the place this year, which would indicate it can stand the dry weather as well as severe frost. The color is dark red. I consider it a very hardy variety. It is among the largest of the varieties now before the public. First year of fruiting.



ENHANCE (S).



BISEL (P).



BRANDY WINE (S).

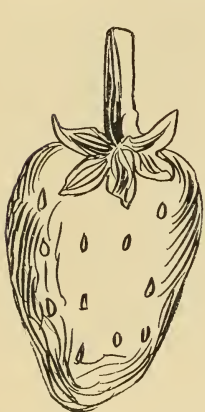
Enhance (S.) A seedling of Windsor Chief and Sharpless from Ohio by H. Young. A strong, vigorous grower and healthy ; season of fruit medium, size, large, sometimes irregular. Dark red in color. Quality fair, somewhat sour. One of the firmest and quite productive ; one of the richest in pollen, and so one of the best to plant with pistillates. It is a market berry, rather than a table variety. Pistillates planted with the Enhance always bear a good crop of well fertilized, fine shaped berries. Fourth year of fruiting.

Bisel (P.) A seedling of the Wilson from Illinois, by D. L. Bisel. It resembles the Wilson, but is larger. A very vigorous grower, making a wide, matted row; has some rust. Season of fruit, medium to late. Quality, good. Medium in firmness and very productive. A variety well worth trying by growers for market. It is being very largely planted in Illinois, and is said to be in great demand in the Chicago market. First year of fruiting.

Brandywine (S.) Thought to be a cross of Glendale and Cumberland, from Pennsylvania. A strong, vigorous grower, making a fine row; quite healthy. Season of fruit, medium to quite late. Size of fruit, large; quality, good, and firmness, medium; color, dark scarlet. It is well spoken of. It seems from the reports of it to succeed on any soil. It did well here the past season. First year of fruiting.

Longfield P. A seedling of Warfield from Kansas by Dr. Stayman. A vigorous grower like its parent. Very healthy foliage, makes lots of runners; season of fruiting, medium to late; size of fruit, medium to large, regular shape, no misshaped berries; is of good quality and very productive; a rich dark color; above medium in firmness; fruit, long and pointed; should think it would carry well, there are few blanks. Three years of fruiting.

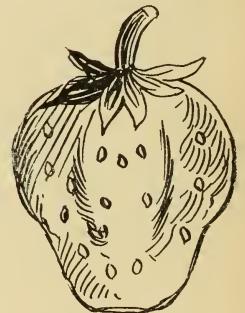
“STEVENSON’S SEEDLINGS.”



LONGFIELD (P).



STEVENSON SEEDLING (No. 7).

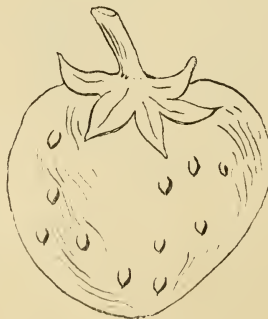


STEVENSON'S (59).

I enclose you outlines of three seedlings of my own, they are promising I only had one plant of each one year from seed, but they are sending out many runners. So I have quite a lot of each for further testing, they are as follows:—



STEVENSON'S (DELLA K).



AROMA (S).



TIMBRELL (P).

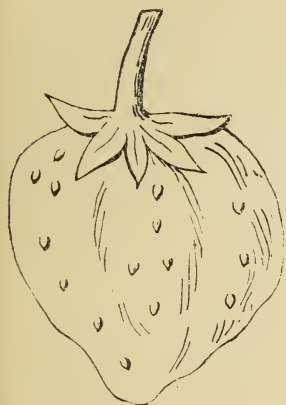
No. 7. Good healthy vigorous grower; season, medium; size, large; quality, good; quite firm, and above medium in productiveness; color, red, flesh red all through.

No. 59. Fine healthy grower ; season, early to medium ; size, large ; quality, good and firm ; productiveness, good. This is a seedling of Howard's No. 41 crossed with Howard's No. 25, both these Howard seedlings all from Haverland crossed with Belmont.

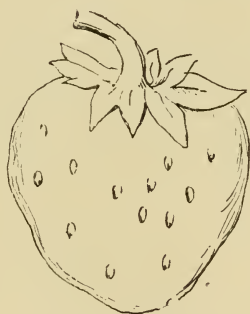
Della K. This is a seedling of Sharpless by Mr. Stevenson of Ontario. Good strong grower ; season, early to medium ; size, large ; quality, good and firm ; productiveness, very good. This is a very promising variety, it is as large as its parent the Sharpless, it colors up better than the Sharpless and very much more productive.

Aroma (S.) A seedling of Cumberland from Kansas by E. W. Oruse. A good vigorous grower ; no rust ; season of fruit, late ; size of berry, large ; fine quality ; quite firm, very good color, a good looking berry and fairly productive, keeps its size well to the last picking ; a good pollenizer for large, late pistillates. It seems to do well in all soils and climates, good reports come from all quarters of the Aroma, the plant is strong and very healthy. Third year of fruiting.

Timbrell (P.) A chance seedling from New York by H. S. Timbrell. The plant is a clean, healthy, vigorous grower, no rust whatever, so far. The season of fruiting is late to very late ; I picked Timbrell on July 24th, 1895, fine beautiful berries. The size is medium to large ; the quality is of the very best and quite firm, will carry well to market and is very productive. The only thing any one could have against the Timbrell here is its color ; it is mottled, red, pink and white, but the fine flavor of the berry makes up for the color. It is a fine berry, seems to stand the frost well. Second year of fruiting.



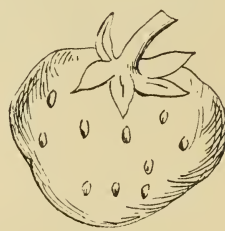
WOOLVERTON (S)



MUSKINGUM (S).



PARKER EARLE (S).



EQUINOX (S).

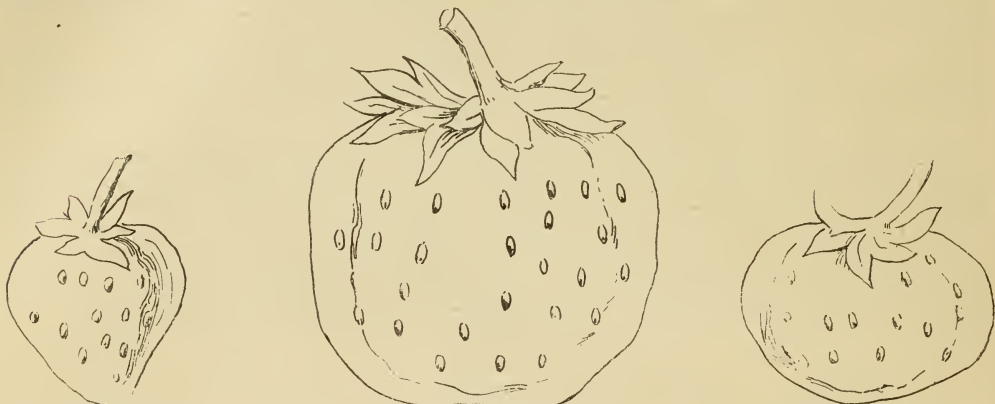
Woolverton (S.) A seedling by Mr. Little of Ontario. The plant is large, strong and healthy, stands the hot, dry weather with the best, the season of fruit is late ; size of berry, one of the largest ; quality, fair ; color, dark crimson, it is firm for so large a berry, and productive. Although the berry is among the late ones in ripening, it is one of the first to bloom, it is rich in pollen and so one of the very best to plant with the large pistillates ; the flesh is white. It is one of the best among the staminate. Fourth year of fruiting.

Muskingum (S.) A seedling from Ohio by G. Kearns. The plant is a good healthy grower, the season of fruit is late ; size of berry, medium to large ; quality is good ; it is firm and medium in productiveness, it is a very fair variety, it did not do as well this year as in 1894 the frost hurt it very much this year. Second year of fruiting.

Parker Earle (S) A seedling from Texas, from the Crescent crossed with Munson's No. eight, by J. Nimond. The plant makes very few runners, rusts somewhat, the plant stools out ; the season is late ; the size of berry is small to medium ; the quality is fair, and the berry is firm ; it is very productive, the plant is not able to mature the great mass of fruit it sets, if it were in a deep rich and moist soil it might do so, but in the soil here it is not worth growing. I have seen the berries just dry up before coloring.

then in such hot, dry weather the berries are small and sour, unless under above conditions of soil I would not advise any one to plant largely of Parker Earle. Fourth year of fruiting.

Equinox (S.) A seedling of Mount Vernon, by M. T. Thompson, Va. The plant is a good strong grower, healthy, little or no rust; season of fruiting, very late; size of berry, medium to large; quality, good; color, crimson; the berry is quite firm, and the plant is very productive, in fact one of the most productive I had. I expect to hear very good accounts of the *Equinox* in the future. First year of fruiting.



GANDY (S).

MAPLE BANK (P).

JERSEY QUEEN (P).

Gandy (S) A seedling of Jersey Queen and Glendale. The plant is strong and vigorous grower, quite healthy; season of fruit is late; size of berry, medium to large; quality of fruit is good; a good looking and shapely berry; color, dark crimson; roundish conical, a very firm berry but a shy bearer, this is its great fault, it gives one grand picking then is done. Third year of fruiting.



BELLE (S).

SOME SHAPES OF THE BELLE.

Jersey Queen (P.) The plant is very healthy, a fair grower, of beautiful green foliage, very often as fresh and green after fruiting as before. The season of fruit is very late, has been the standard late berry for some years; size of fruit, large to very large of fine glossy appearance that brings the highest price in the market; it makes a better growth of plants the second year than the first. The berry is firm, and good quality; medium in productiveness. I consider it valuable, as it extends the fruiting season sometimes a week or more. Sixth year of fruiting.

Maple Bank (P.) A seedling by Wm. Stevenson, of Guelph, Ont., thought to be a cross of *Crescent* and *Wilson*. The plant is a strong, vigorous grower, making wide matted row. Season medium to late; size of berry, large; quality, best; very firm and productive. Third year of fruiting.

Belle or Crawford's, 51 (P.) A seedling of unknown parentage, by M. T. Thompson, of Virginia. The plant is a strong grower, and healthy. Season of fruit very late, none ripe on 4th July when other kinds were almost over fruiting. Size of berry, large, long, and often irregular; some fan shaped; quality of fruit is good, and berry is firm, and plant quite productive. Second year of fruiting.

The above have done the best this year; but there are other varieties, that under other conditions would be quite as profitable as many of the above. This has been a very exceptional year in strawberry growing, from two causes: first, the week of hard frost in blooming time, and then the very hot and dry season when the fruit was maturing. So it would be hardly fair to take the results of this year as a criterion of what the various varieties are able to do. Some of the kinds that in an average year are among the best, this year were caught at a most critical time in their blooming and did not recover. Some of the kinds sent up a full second set of fruit stalks, notably among these was the *Clyde*. I think this is the coming variety for Ontario as a market berry.

I have the report of thirty strawberry experts as to the five best sorts for market purposes. These men are scattered over the United States and Canada. Twenty of them named *Bubach*, fifteen of them named *Warfield*, thirteen named *Haverland*, eleven named *Lovett*, ten *Parker Earle*, nine *Crescent*, seven *Greenville*, six *Timbrell*, four *Gandy*, three *Van Deman*, three *Saunders*, these seeming to be the most popular sorts that have been generally disseminated. Therefore, one commencing to grow for market could not go far wrong if he planted the five which received the most votes, viz., *Bubach*, *Warfield*, *Haverland*, *Lovett* and *Parker Earle*.

I should place *Woolverton* and *Saunders* before *Lovett*, and *Greenville* in place of *Parker Earle*, and I should put *Clyde* among the first three, but of course *Clyde* was not grown by any of the thirty voting on the five best market sorts, as it is only offered for sale for the first time this fall, although I have fruited it for three seasons.

Some growers make little or no distinction between the kinds intended for market and those for the table. I think this distinction should be made, because it is very seldom that the finest flavored varieties will produce the most boxes or get to market in the best condition.

The variety that is best for the table may be of poor color (*i.e.*, *Timbrell*) and a light yielder (*i.e.*, *Gillespie*) or poor in firmness.

The majority of those who buy in the market want size first of all, then color and freshness of look, and are not at all particular as to the flavor or quality, perhaps never tasting a single berry, but buying by the eye alone, while for some people looks go for very little and they want quality alone. Quite a number of varieties that stand high in quality of fruit, and are the very best for the table, cannot be got to market in good shape and so should not be marked high as a market variety except it may be for a very near market.

It may be of benefit to those who have not grown any great number of the later varieties to give a list pointing out the different points in which they excel, as follows:

Early Sorts: *Van Deman*, *Margaret*, *Michel's Early*, *Rio*, *Stone's Early*, *Beder Wood*, *Clyde*, *Cyclone*, *Haverland*, *Crescent*, *Meek's Early*, *Dayton*.

Mid-Season: *Bubach*, *Warfield*, *Greenville*, *Leader*, *Saunders*, *Tennessee Prolific*, *Mary*, *Enhance*, *Bisel*, *Brandywine*, *Lovett*, *Williams*, *Longfield*.

Late: *Aroma*, *Timbrell*, *Woolverton*, *Muskingum*, *Gandy*, *Parker Earle*, *Equinox*, *Jersey Queen*, *Maple Bank*, *Belle*, and others.

Quality: *Iowa Beauty*, *Brunette*, *Leader*, *Van Deman*, *Banquet*, *Timbrell*, *Jessie*, *Gillespie*, *Auburn*, *Saunders*.

Size Large: *Aroma*, *Bubach*, *Brandywine*, *Belle*, *Briggs*, *Clyde*, *Dew*, *Enhance*, *Greenville*, *Saunders*, *Maple Bank*, *Haverland*, *Edith* (largest), *Gandy*, *Wm. Belt*, *Mary*

Howard's No. 41, Jucunda Improved, Woolverton, Jessie, Jersey Queen, Muskingum, Marshall, Ohio Centennial, Van Deman, Timbrell, Eureka, Hunt's No. 3.

Market Sorts : Clyde, Saunders, Bubach, Haverland, Greenville, Van Deman, Warfield, Aroma, Brandywine, Longfield, Cyclone, Robinson, Tennessee Prolific, Lovett, Mary, Beder Wood, Enhance, Williams.

There are other varieties that have good qualities worthy of trial. Some that have not been fully tested as yet and so are not placed in the lists of the varieties that after full trial have secured recognition over a wide extent.

Below is a list of kinds having many good points, some of them not fully tested :

Phillips, Beverley, Magnate, Barton's Eclipse, Afton, Gertrude, Howard's No. 25, Hiawatha, Jurabolo, Kansas Prolific, Princess, Smith's, Sunnyside, Scarlet Ball, Springdale, Huntsman, Splendid, Thompson's No. 40, Gandy Bell, Vera, Plow City, Beauty, Richmond, Hutch Experiment Station 24, Effie May, Charlie, Ivanhoe, Epping, Judsonia, Oberholtzer, America, Snowball.

The following are of little merit and I have decided they are not worth growing :

Anna Forrest, Auburn, Dayton, Dew, Edward's Favorite, Eureka, Farnsworth, Gillespie, Accomac, Bessie, Stevens, Westbrook, Alabama, Clark's E. Middlefield, Mrs. Cleveland, Prize, Martha, Crimson Cluster, Beebe, Parker Earle, Price, Lady Rusk, Swindle, Regina, E. P. Roe, Idaho, Parnell, Standard, Belle of Lacrosse, Primate, Gen. Putnam, Alpine, Hull's No. 6., Hull's No. 8, Jessie, Kossuth, Stone's No. 7, and No. 16, also No. 15, Shuster's Gem.

I have the following new varieties to fruit in 1896 for the first time :

Varieties.	Sex.	Varieties.	Sex.	Varieties.	Sex.
Apache	S	Gardner	S	Reihl's No. 5	P
Aug Nicaise	S	Glen Mary	P	Shawull	S P
Allen		Giant	S	Sharpless Improved	S
Allen's No. 6	P	Hersey	S	Sunrise	P
Allen's No. 13	P	Homestead		Triomphe de Gand	S
Avery's Seedling	P	Hull's No. 3	S	Tubbs	
Black Prince	S	H. W. Beecher	S	Thompson's No. 40	P
Belrin	P	Howard's 501	S	Thompson's 104	
British Queen	S	Howard's 23	P	Victor Hugo	S
Beede's No. 2		Holland	P	West Lawn	P
Banquet	S	Knick's	S	Weston	P
Brunette	S	Laxton's No. 1	S	Yahoo	S
Bouncer	S	Lady Thompson	S	Zulu	S
Cardinal	S	Leviathan	S	Huntsman	S P
Columbia	S	Lady Franklin	P	Buster	S
Champion of England	S	Lord Sheffield	S	Onward	S
Carrie	P	Murray	S	Dora	P
Eleanor	S	Paris King	S	Sargeant	S
Enormous	P	Pet	S	Howard's No. 6	P
Erie	S	Pine Hill No. 20	P	Hunn	P
Fountain	S	Roser	S		
Gunton Park	S	Reihl's No. 6	S		

My report would be incomplete without mentioning the seedlings in the trial plots. One plot is Howard's No. 41, crossed with Marshall and Brandywine. Another plot is Timbrell, crossed with Brandywine and Marshall. Another plot is Marshall seedlings. I have another plot, Howard's No. 41, crossed with Howard's No. 25 and other seedlings; both these seedlings are from Haverland, crossed with Belmont. Amongst the above seedlings are some very fine, strong, healthy plants, giving promise for the future; very vigorous. The size of the fruit is often indicated by the size of the leaf. If this holds good I shall have some large ones among them. Hoping that we may have a more favorable season for strawberries in 1896 I will close.

E. B. STEVENSON,
Freeman.

BURLINGTON STATION.—A. W. PEART, FREEMAN, EXPERIMENTER.

NOTES ON VARIETIES OF FRUITS TESTED PREVIOUS TO 1895.

APPLES.

American Golden Russet. The trees are healthy, hardy and vigorous, but not very productive.

Baldwin. One of our most popular varieties. Tree healthy, medium vigor, hardy enough for all practical purposes, and very productive.

Cranberry Pippin. Tree healthy, very vigorous and hardy. Comes into bearing late, but when it commences is productive and a good shipper.

Early Harvest. Tree healthy, vigorous and productive, but fruit somewhat subject to scab. This year, however, it was clean and of fine quality.

Esopus Spitzenburg. Tree medium vigor, medium hardiness, and not sufficiently productive to be profitable.

Fameuse. Vigorous, hardy and productive, but of late years liable to spot.

Greening. Tree vigorous, hardy and very productive. One of our most profitable.

Holland Pippin. Tree healthy, hardy, vigorous, and fairly productive, but no longer profitable on account of the spot.

King. Tree healthy, hardy and vigorous. Requires age to be productive. Should have a place in a commercial list for planting on account of its great value for dessert, cooking and market purposes.

Northern Spy. Tree healthy, hardy and vigorous. Late in bearing, but then productive. The fruit of late years has been somewhat affected with the spot.

Ribston Pippin. Tree medium vigor, healthy, hardy and very productive. Our best and most profitable fall apple.

Red Astrachan. Tree vigorous, hardy and productive. The fruit some seasons is injured by the spot.

Roxbury Russet. Tree vigorous, hardy and medium productive. The fruit cannot rank with the Baldwin or Greening for profit.

I have also the following varieties of apples, which have scarcely reached bearing age: Duchess of Oldenburg, Gravenstein, Hawthornden, Longfield, Pewaukee, St. Lawrence, Tolman Sweet, Wagener and Wealthy.

PEARS.

Anjou. Tree vigorous, healthy, hardy and fairly productive. Fruit large and excellent, but drops from the trees too easily. A most valuable variety for market. Season, November to January.

Belle Lucrative. Tree medium vigor, hardy and moderately productive. Fruit medium and of fine quality. Season, September.

Bartlett. The most extensively grown of any variety in this district. Tree medium vigour and hardiness, and very productive. Fruit large and most excellent. Season, early September.

Clapp's Favorite. Tree very vigorous, hardy and productive. Fruit large, quality fine. Season, late August.

Duchess D'Angouleme. As a dwarf this pear has of late years been very extensively planted. Tree very vigorous, hardy and productive. Fruit large and excellent. Season, October to November.

Flemish Beauty. Tree vigorous, hardy and productive; but of late years the fruit has been almost unsalable through the ravages of the scab. Season, September.

I have also the Duchess, as a standard; the Kieffer, a rank, vigorous grower, and the Sheldon; but the trees are young, and have had but little fruit on as yet.

PLUMS.

Bradshaw. Tree vigorous, healthy and hardy, but only moderately productive. An upright grower. Fruit large, reddish purple. One of our earliest plums, and commands a high price. Season, August.

Lombard. Probably our most profitable plum. Tree spreading and a vigorous grower when young; hardy and very productive. Fruit medium, violet red. Season, early September.

Native Blue. Fifteen or twenty years ago quite extensively grown, but they were swept away by the black knot. Tree vigorous, hardy and productive. Fruit medium, dark blue. Season, September.

Reine Claude. A new and very promising plum in this district. Tree vigorous, hardy and productive. Fruit medium, roundish, greenish-yellow, rich and sweet. Season, September to October.

Seedling No. 1. Known here as *Ireland's Seedling*. Tree a moderate grower, hardy and productive. Fruit medium to large, roundish-oval, reddish-purple with a rich bloom. One of our best plums for dessert, cooking and market. A very small and free stone. Season, August.

Seedling No. 2. Tree vigorous, hardy and productive. Fruit medium, long-oval, bluish-purple. A good cooking and market plum. Season, early September.

Seedling No. 3. Tree a moderate grower, hardy and moderately productive. Fruit medium, oval, yellow. Season, Early September,

In addition, I have these varieties, planted in 1892—they have grown well, but have not as yet fruited much:—Abundance, Coe's Golden Drop, General Hand, German Prune Glass' Seedling, Gueii, Imperial Gage, Italian Prune, Marianna, Monroe Egg, Niagara, Ogan, Prunus Pissardi, Prunus Simonii, Purple Egg (Hudson River), Purple Egg, Shipper's Pride, Smith's Orleans, Staunton, Washington, Yellow Egg, Yellow Gage.

GRAPES.

Agawam (Roger 15). Vine, a vigorous grower, but not very productive, and liable to mildew. Bunch, medium to large. Berry, red, large, thick skin. Season, September.

Brighton. Vine, vigorous and productive, but somewhat subject to mildew. Bunch, large and shouldered. Berry, purplish-red, medium, and excellent in quality. Season, September.

Champion. Vine, very vigorous, hardy and productive. Bunch, medium to large. Berry, medium, black, and of poor quality. Season, August.

Concord. The most generally grown here of any variety, and probably our most profitable grape. Vine, vigorous, hardy, healthy, and very productive. Bunch, large. Berry, medium to large, black. Season, September.

Delaware. Vine, short-jointed, light, but healthy grower, hardy and an abundant bearer, but unprofitable commercially. "They don't fill up." Bunch, small. Berry, small, red. Season, September.

El Dorado. A new grape here, and not very promising. Vine, moderately vigorous, and only fairly productive. Bunch, medium. Berry, medium, white. Season, September.

Eaton. A new black grape here. Vine, vigorous and healthy, but, as yet, (three years old,) unproductive.

Jessica. Vine, a moderate grower, healthy, hardy and productive, but, like the Delaware, unprofitable. Bunch, small. Berry, small, white, quality fine. Season, September.

Lady. Vine, medium vigor, hardy and only fairly productive. Bunch, medium. Berry, medium, white. Season, early September.

Lindley (Roger 9). One of our best red grapes. Vine, vigorous, hardy and productive. Bunch, large. Berry, medium to large, quality excellent. None better for market as well as dessert. Season, early September.

Moore's Diamond. A new and most promising white grape. Vine, vigorous, hardy and very productive. Bunch, large, shouldered. Berry, large. Season, early September.

Moore's Early. Vine, light grower, hardy and only moderately productive. Bunch, medium. Berry, large, black. Season, August and early September.

Moyer. Vine, a matty, short-jointed, healthy grower, hardy and productive. Bunch, small. Berry, small, red. Very early. Season, August.

Niagara. Vine, very vigorous and productive, but somewhat tender, and should have winter protection. Bunch, large. Berry, large, quality only fair. Season, September.

Vergennes. A promising red grape for this locality. Vine, vigorous, hardy and very productive. Bunch, large. Berry, large. Season, September and October.

Wilder (Roger 4). Vine, vigorous, somewhat tender, and moderately productive. Bunch, large. Berry, large. Season, September.

Worden. One of our most profitable black grapes. Vine, vigorous, hardy and very productive. Bunch, large. Berry large, quality excellent. Season, early September.

Wyoming Red. This red grape promises to be valuable for market purposes. Vine, a fair grower, hardy, healthy and very productive. Bunch, small to medium. Berry, medium, quality only fair. Season, August and September, same as Moore's Early.

RASPBERRIES.

Brandywine. Cane, stocky, hardy and productive. Berry, medium to large, red, firm, quality rather inferior.

Cuthbert. Cane, vigorous, hardy, and very productive. An upright grower. Berry, large, bright red, firm, of good quality. Season, medium to late.

Highland Hardy. Cane, healthy, hardy and fairly productive. Berry, small to medium, red, quality inferior. Season, early.

Marlboro'. Cane, healthy, hardy and productive. Berry, large, firm, red, and only fair in quality. A valuable variety here for market. Season, early.

Turner. Cane, healthy, hardy and productive. Berry, red, medium, soft, quality excellent. Season, medium.

BLACKBERRIES.

Snyder. Cane, healthy, hardy, and very productive. Berry, medium, firm, quality good. Season, medium.

Lawton. Cane, a strong grower, and very productive, but requires winter protection here. Berry, large, somewhat soft, quality excellent.

I also planted for testing, during the spring of 1895, the following varieties. The soil is a rich gravelly loam, underdrained, damp, but not wet :

Raspberries. All Summer, Columbia, Eureka, Hilborn, Golden Queen, Kansas, Palmer, Progress, Reliance, Shaffer's Colossal, Thompson's Early.

Blackberries. Agawam, Child's Tree, Early Cluster, Early Harvest, Erie, Ganior, Kittatinny, Lovett's Best, Maxwell, Ohmer, Stone's Hardy, Taylor's Prolific, Western Triumph, Wachussetts.

Of these varieties, Columbia and Shaffer's Colossal have made a very vigorous growth. Kansas and Hilborn also a strong growth, while the other varieties have made a growth from medium to strong. All are in a healthy condition, notwithstanding the drouth and extremes of temperature.

In addition to the above I received a few other varieties for planting, but owing to their late arrival and other unfavorable conditions, they entirely failed to grow.

CURRENTS.

In the spring of 1895 I planted one thousand currant bushes, consisting of the following varieties: Cherry, Fay's Prolific Versailles, Raby Castle, Victoria, White Grape, Naples and Champion. They have made a good growth and are thrifty and healthy.

CATALOGUE OF FRUITS FOR THE USE OF PLANTERS.

APPLES.

Varieties tested.	Season. (Month of use.)	Tree.				Fruit.				Total value of fruit.	Total value of variety.
		Vigor, Scale 1-10.	Hardiness, Scale 1-10.	Productiveness, Scale 1-10.	Total value of tree.	Quality, Scale 1-10.		Value, Scale 1-10.			
						Dessert.	Cook- ing.	Home market.	Foreign market.		
BAY OF QUINTE STATION.											
Albury	Aug.-Sept	8	10	6	24	6	6	4	.....	16	40
Alexander	Aug.-Oct	10	10	8	28	4	9	9	9	31	59
American Golden Russet	Jan.-May	8	10	6	24	8	8	7	9	32	56
Bailey Sweet	Nov.-Mar	6	8	8	22	4	8	4	4	20	42
Baldwin	Jan-Mar	6	7	8	21	4	6	8	8	26	47
Beauty of Kent	Oct.-Nov	10	10	8	28	4	6	8	8	26	54
Ben Davis	Mar.-May	8	10	10	23	4	6	6	9	25	53
Benoni	July-Sept	8	10	8	26	10	8	4	7	29	55
Blenheim Pippin	Nov.-Mar	10	10	10	30	6	7	9	9	31	61
Bonum	Dec.-Feb	8	10	10	28	8	8	7	7	30	58
Cabashea	Dec.-Feb	10	10	5	25	2	6	6	6	20	45
Canada Red	Dec.-Mar	8	9	10	27	6	8	8	.....	22	49
Duchess	Aug.-Sept	10	10	10	30	6	9	10	9	34	64
Fallowater	Jan.-Mar	10	10	5	25	6	8	8	8	31	56
Fameuse	Sept.-Dec	8	8	10	26	10	8	10	8	36	62
Fall Queen (Haas)	Sept.-Nov	8	8	8	24	5	6	6	6	23	47
Grand Sultan	Aug.-Sept	10	10	8	28	5	8	6	6	25	53
Hastings	Jan.-Feb	8	9	8	25	8	7	7	6	28	53
Hawthornden (new)	Oct.-Dec	8	8	8	24	7	7	8	8	30	54
Hawthornden (old)	Sept.-Nov	7	8	8	23	5	7	5	7	24	47
Highland Beauty	Jan.-Mar	6	9	8	23	9	7	7	7	30	53
Horn	Dec.-Mar	8	10	10	28	8	7	7	7	29	57
Hurlbut	Dec.-Feb	7	9	7	23	8	8	8	8	32	55
Jonathan	Dec.-Mar	8	8	9	25	10	7	8	9	34	59
Lady	Jan.-Mar	7	8	9	24	9	.....	1	2	12	36
La Rue	Oct.-Dec	10	8	6	24	.....	7	7	6	20	48
Lord Burleigh	Jan.-May	10	9	9	28	8	10	8	8	34	62
Lord Suffield	Aug.-Sept	6	8	9	23	4	7	5	5	21	44
Margil	Nov.-Jan	6	7	9	22	10	8	7	7	32	54
Mountain Beet	Sept.-Oct	8	9	8	25	6	6	5	.....	17	42
Mountain Tulip	Sept.-Oct	7	8	8	23	6	6	6	.....	18	41
Northern Spy	Jan.-Mar	10	8	10	28	9	9	9	9	36	64
Northfield Beauty	September	8	9	9	26	9	8	9	.....	26	52
Mother	Nov.-Jan	5	7	7	19	10	8	7	7	32	51
Ontario	Jan.-Mar	8	9	10	27	9	9	9	9	36	63
Pomme Grise	Nov.-Jan	7	8	9	24	9	8	5	.....	22	46
Rawle's Janet	Feb.-June	6	9	10	25	5	4	5	5	19	44
SIMCOE STATION.											
Alexander	Oct.-Dec	10	10	10	30	5	10	10	9	34	64
Astracan, Red	Aug.-Sept	9	10	8	27	8	8	7	1	24	51
Baxter or La Rue	Oct.-Feb	9	10	8	27	4	9	8	8	29	56
Ben Davis	Oct.-June	9	9	10	28	2	4	8	9	23	51
Colvert	Oct.-Jan	9	10	9	28	5	9	9	8	31	59
Duchess	Aug.-Sept	9	9	10	28	6	10	10	8	34	62
Fameuse	Oct.-Jan	8	8	10	26	10	8	9	8	35	61
Fall Queen (Haas)	Oct.-Feb	10	10	10	30	4	7	7	8	26	56
Gideon	Oct.-Dec	10	10	10	30	8	9	10	8	35	65
Grime's Golden	Oct. Mar	7	5	8	20	9	4	6	7	26	46
Hurlbut	Oct.-Mar	8	9	8	25	8	8	8	8	32	57
King of Tompkins	Oct.-Mar	7	5	5	17	9	9	10	10	38	55
Maiden's Blush	Oct.-Dec	9	10	10	29	5	8	9	8	30	59
Mann	Jan.-April	9	10	9	28	8	9	9	10	36	64
Northern Spy	Oct. May	9	7	9	25	10	10	10	10	40	65
Pewaukee	Oct.-Mar	10	10	8	28	6	8	9	9	34	62
R. I. Greening	Oct.-May	8	5	10	23	8	10	8	9	35	58

CATALOGUE OF FRUITS.—*Continued.*APPLES.—*Concluded.*

Varieties tested.	Season. (Month of use.)	Tree.				Fruit.				Total value of fruit.	Total value of variety.
		Vigor, Scale 1-10.	Hardness, Scale 1-10.	Productiveness, Scale 1-10.	Total value of tree.	Quality, Scale 1-10.		Value, Scale 1-10.			
						Dessert.	Cook- ing.	Home market.	Foreign market.		
SIMCOE STATION.— <i>Concluded.</i>											
St. Lawrence	Oct.-Nov	9	10	10	29	10	9	9	5	33	62
Ribston Pippin	Oct.-Feb	8	8	8	24	10	8	10	10	38	62
Tolman Sweet	Oct.-Mar	10	10	9	29	6	5	2	5	18	47
Tetofsky	August	9	10	9	28	7	9	6	.....	22	40
Twenty Ounce	Oct.-Jan	9	9	8	26	4	7	8	9	29	55
Wealthy	Sept.-Dec	9	10	10	29	8	8	9	8	33	62
Wagener	Oct.-Mar	8	9	8	25	7	8	8	7	30	55
Yellow Transparent	August	10	10	8	28	6	8	6	.....	20	48

PEARS.

BAY OF QUINTE STATION.											
Variety	Season	Vigor	Hardness	Productiveness	Total value of tree	Dessert	Cooking	Home market	Foreign market	Total value of fruit	Total value of variety
Annaas d'Ete	Aug.-Sept	8	6	4	18	4	4	5	.....	13	31
Bartlett	September	8	6	9	23	9	9	10	.....	28	51
Belle Lucrative	Sept.-Oct	8	8	8	24	8	8	8	.....	24	48
Beurre Clairgeau	Nov.-Dec	8	6	8	22	4	6	8	.....	18	40
Beurre d'Anjou	Nov.-Jan	10	10	6	26	8	8	10	.....	26	52
Beurre Gris d'Hiver	March	10	10	8	28	4	4	4	.....	12	40
Beurre Hardy	Sept.-Oct	10	10	10	30	8	8	9	.....	25	55
Buffum	October	10	10	10	30	4	4	4	.....	12	42
Boussock	Sept.-Oct	10	10	10	30	8	9	9	.....	26	56
Clapp's Favorite	Aug.-Sept	10	8	10	28	8	8	9	.....	25	53
General Todleben	Nov.-Dec	8	9	8	25	10	8	8	.....	26	51
Josephine de Malines	Dec.-Mar	8	9	9	26	10	8	8	.....	26	52
Lawrence	Dec.-Jan	8	10	10	28	8	.....	8	.....	16	44
Louise Bonne	Sept.-Oct	7	8	9	24	6	.....	8	.....	14	38
Mount Vernon	Oct.-Nov	9	10	10	29	6	.....	5	.....	13	42
Onondaga	Sept.-Nov	9	10	10	29	5	.....	7	.....	12	41
Sheldon	October .....	.....	.....	.....	.....	10	.....	9	.....	19	.....

CATALOGUE OF FRUITS.—Continued.

GRAPES.

Varieties tested.	Season.	Vine.				Value 1-10.			Remarks.		
		Vigor, Scale 1-10.	Hardiness, Scale 1-10.	Productiveness, Scale 1-10.	Freedom from disease, Scale 1-10.	Total Value of Vine.	Dessert.	Market.		Total value of fruit.	Total value of variety.
WENTWORTH STATION.											
Adirondac	Sept	3	2	2	2	9	9	2	11	20	One of the best, very weak, needs protection.
Alvey (Hagar)	Oct	7	8	6	8	29	2	2	4	33	Of little value.
Agawam (Roger 15) ...	Oct. & Nov.	9	9	8	4	30	9	9	18	48	Most productive on clay loam with hard subsoil. Needs long pruning.
Amber	Oct	6	6	3	4	19	2	2	4	23	Too late ; does not mature.
Amber Queen	Oct. & Nov.	7	6	5	6	24	6	5	11	35	A long keeper.
August Giant	Sept	8	8	7	8	31	5	5	10	41	Too tender to ship.
Barry (Roger 43)	Oct	9	9	8	7	33	7	7	14	57	One of the best black Roger's.
Black Pearl	Sept	9	9	9	9	36	2	2	4	40	
Brighton	Sept	8	10	7	6	33	8	7	15	48	
Catawba	Oct. & Nov.	8	10	8	5	31	10	10	20	51	Will ripen in favorable localities.
Cottage	Sept	6	8	3	8	25	4	4	8	33	Crops from the stem.
Creveling	Sept	10	10	6	6	32	6	4	10	42	
Diana	Oct	9	9	7	6	31	6	6	12	43	
Dracut Amber	Sept	6	9	7	6	28	2	4	6	34	
Duchess	Oct	6	5	6	8	25	5	6	11	36	A choice winter grape.
Eldorado	Sept	8	8	6	7	29	9	6	15	44	Very fine for amateurs.
Empire State	Sept	7	8	4	7	26	4	4	8	34	
Eumelan	Sept	6	7	6	7	26	7	5	12	38	
Goethe (Roger No. 1) ..	Oct	9	9	8	8	34	4	7	16	50	
Jefferson	Oct. & Nov.	4	5	5	7	21	6	6	12	33	Ripens too late.
Lady	Sept	2	10	2	6	20	8	8	16	35	Not productive.
Lady Washington	Oct	9	9	7	5	30	4	4	8	38	Requires a longer season than ours.
Lindley (Roger's 9)	Sept	9	10	8	8	35	9	9	18	53	
Marion	Oct	9	9	7	7	32	2	2	4	36	
Martha	Sept	4	6	4	6	20	7	4	11	31	An amateur grape.
Massasoit (Roger 3) ...	Sept	10	9	6	6	31	8	7	15	46	Should be grown with other varieties to fertilize it.
Missouri Riesling	Oct	7	8	7	5	27	4	3	7	34	A wine grape.
Moore's Early	Sept	5	9	4	9	27	7	8	15	42	Not productive enough.
Moore's Diamond	Sept	6	8	6	7	27	7	7	14	41	
Noah	Oct	9	9	10	5	33	2	3	5	38	Too poor in quality.
Perkins	Sept	8	8	7	7	30	3	5	8	38	
Prentiss	Oct	6	7	6	6	25	5	5	10	35	Overloads and does not ripen its wood.
Rebecca	Sept	3	4	3	3	13	8	5	13	26	An amateur grape.
Requa (Roger 28)	Sept	10	8	8	7	33	8	8	16	49	One of the best Roger's.
Salem	Sept	10	8	8	6	32	8	9	17	49	
Taylor	Oct	9	9	3	7	28	2	2	4	32	Of no value.
Vergennes	Oct. & Nov.	7	7	6	7	27	6	8	14	41	
Wilder	Sept	7	9	7	7	30	7	8	15	45	
Worden	Sept	7	10	7	8	32	9	8	17	49	
Wyoming Red	Sept	8	8	7	8	31	4	6	10	41	Very handsome, but too poor in quality.

CATALOGUE OF FRUITS.—Continued.

STRAWBERRIES.

TESTED BY E. B. STEVENSON, OF LOWVILLE, ONT., IN 1894, AND PREVIOUS YEARS.

Variety.	Sex.	Season.	Plant. Value, scale 1-10.			Fruit. Value, scale 1-10.			Total value of fruit.	Total value of variety.
			Vigor.	Productiveness.	Total value of plant.	Dessert.	Market.			
Aroma	B	L	8	8	16	8	9	17	34	
Auburn	P	M	9	7	16	10	7	17	34	
Barton's Eclipse	P	M	8	7	15	7	7	14	29	
Beder Wood	B	E	6	8	14	6	8	14	28	
Beverley	B	M L	7	8	15	8	9	17	32	
Boynton	P	E M	9	9	18	6	4	10	28	
Bubach 5	P	M	7	9	16	8	10	18	34	
Chairs	P	E M	7	6	13	8	6	14	27	
Clyde	B	E	9	9	18	9	9	18	36	
Cyclone	B	E	9	9	18	8	8	16	34	
Dayton	B	M	9	6	15	7	8	15	30	
Dew	B	L	5	4	9	7	6	11	20	
Edgar Queen	P	M L	8	5	13	7	4	13	26	
Enhance	B	M	9	8	17	6	10	16	33	
E. P. Roe	B	M L	5	6	11	6	5	11	22	
Eureka	P	L	8	5	13	6	5	11	24	
Gandy	B	L	8	6	14	8	6	14	28	
General Putman	P	E M	8	5	13	5	4	9	22	
Gillespie	B	M	8	7	15	10	7	17	32	
Governor Hoard	B	M L	8	7	15	9	7	16	31	
Greenville	P	M	4	10	14	8	10	18	32	
Haverland	P	E	9	10	19	8	10	18	37	
Iowa Beauty	B	M	8	7	15	10	7	17	32	
Leader	B	E	5	5	10	10	6	16	26	
Longfield	P	M L	9	9	18	8	9	17	35	
Lovett	B	M	9	7	16	6	8	14	30	
Maple Bank	P	M L	9	8	17	9	8	17	34	
Marshall	B	M	8	6	14	8	7	15	29	
Michel's Early	B	E	10	5	15	6	8	14	29	
Mrs. Cleveland	P	M	8	6	14	5	5	10	24	
Muskingum	B	M	8	7	15	8	6	14	29	
Parker Earle	B	M L	6	9	15	8	8	16	31	
Phillips' Seedling	B	M	9	7	16	7	6	13	29	
Princeton Chief	P	L	8	5	13	8	8	16	29	
Saunders	B	M	9	9	18	9	9	18	36	
Swindle	P	M	5	5	10	6	7	16	23	
Tennessee Prolific	B	M	10	9	19	8	8	16	25	
Timbrell	P	L	7	8	15	9	6	15	30	
Van Deman	B	E	10	8	18	9	9	18	36	
Warfield	P	E M	10	9	19	8	9	17	36	
Williams	B	M	9	8	17	5	8	13	30	
Woolverton	B	L	9	8	17	9	8	17	34	

CATALOGUE OF FRUITS.—Continued.

GOOSEBERRIES.—TESTED AT BRAMPTON BY A. MORTON.

Variety.	Season.	Plant. Value, scale 1-10.				Fruit. Value, scale 1-10.			Total value of variety.
		Vigor.	Productiveness,	Freedom from mil- dew.	Total value of plant.	Dessert.	Market.	Total value of fruit.	
Bloodhound	M	9	9	10	28	9	9	18	46
Champagne	E	9	9	10	28	10	10	20	48
Companion	M	9	9	10	28	10	9	19	47
Coiner	M	9	9	10	28	10	8	18	46
Crown Bob	M	8	9	10	27	9	10	19	46
Duke of Sutherland	M	10	10	10	30	10	10	20	50
Gipsy Queen	M	10	8	10	28	9	9	18	46
Industry	M	10	10	10	30	7	7	14	44
Keepsake	M	9	10	10	29	9	9	18	47
Lancashire Lad	M	9	9	10	28	10	10	20	48
Large Scotch Red	M	10	8	10	28	9	9	18	46
Morden's Golden Drop	M	9	10	10	29	10	10	20	49
Ocean Wave	M	8	9	10	27	10	10	20	47
One-of-them	M	10	9	10	29	10	10	20	49
Pindston Green Gage	M	10	9	10	29	10	10	20	49
Princess Royal	M	8	8	10	26	9	9	18	44
Red Warrington	M	9	9	10	28	10	10	20	48
Ringer	M	8	8	10	26	9	9	18	44
Scotch Jam	M	10	10	10	30	4	10	14	44
Shakespeare	M	7	6	10	23	9	9	18	41
Smolenski	M	8	7	10	25	9	9	18	43
Thumper	M	10	9	10	29	9	9	18	47
Two-to-one	M	10	9	10	29	10	10	20	49
Whitesmith	M	9	8	10	27	10	10	20	47
Wonderful	M	10	10	10	30	10	10	20	50
Yorkshire Lad	M	9	9	10	28	10	10	20	48



APPENDIX.

REPORT OF THE DIRECTOR OF EXPERIMENTAL SPRAYING.

In presenting my report on the spraying experiments conducted during the past season, and covering as they did so wide a range of territory, there must naturally be more or less difference in the climatic conditions causing varying results to follow, as all are aware some parts of the territory experienced a severe frost, and at a time when the fruit-buds were very susceptible to injury, and also when fungous and insect enemies were in their most tender period of development, causing a check to their work of destruction as well as the loss of the fruit crop; and this, in the westerly portion of the province at least, being followed by a prolonged drouth. All these influences combined rendered the work of as little effect as possible, and yet there is sufficient evidence to convince us of the benefits to be derived.

My first work was to carefully look over the territory to be covered by the work, and select those points most largely engaged in fruit culture, and where the largest numbers of people interested might witness the work and results that would follow; selecting also such points as were accessible by rail in order that the experimenters could accomplish their work each day and the whole be repeated at intervals of twelve days until completed.

I then sent notices to a number of prominent fruit growers in each locality, stating I would visit their locality on a certain day, and would be glad to meet as many as could conveniently attend to explain to them the work that was intended to be done, and ask their hearty co-operation in carrying it out. In many places large numbers were present, and a resolution passed expressing their appreciation of the work the Department had undertaken.

The next point was to secure capable experimenters to perform the work, and suitable outfits for the purpose. I then made this proposition to the spray pump manufacturers of Ontario, that they would furnish the various points with a complete outfit free of charge on the understanding that those outfits were suitable to perform the work. They met this proposition in a liberal manner, and I trust mutually advantageous; and, in order to convince me of the efficiency of the work their pumps were capable of doing, they brought them to my orchard, where fifty gallons of the Bordeaux mixture was supplied and applied to the trees in a satisfactory manner.

On the 24th of April the first experimenter, Mr. A. W. Muir, commenced his work at Chatham in the southern division, taking in Windsor, Kingsville, Blenheim, Appin, Aylmer, Simcoe, Jarvis, Marshville and Welland. The second experimenter, Mr. H. H. Farrell, commenced his work at Theford on the 26th of April, taking in Clinton, Walkerton, Mount Forest, Owen Sound, Meaford, Collingwood, Barrie, Orillia and Newmarket. And the third experimenter, Mr. Judson O. Konkle, started on the 29th of April, at Whitby, then Bowmanville, Cobourg, Belleville, Napanee, Kingston, Gananoque, Brockville, Morrisburg and Cornwall. All continued their rounds with promptness and regularity until six applications were made. The following will give the date of each spraying, the weather on the day of applying, the appearance of the foliage and fruit as noted by the experimenters on the different dates, and my report as to results at the end of the season on personal inspection.

In this report copper sulphate will mean four pounds of copper sulphate to fifty gallons of water. Bordeaux will mean four pounds of copper sulphate and four pounds of fresh lime to fifty gallons of water, and where Paris green is added means four ounces; this is for apple trees.

In the *first* spraying the copper sulphate solution was used at Chatham, Thedford, Clinton, Walkerton, Mount Forest, Owen Sound and Meaford, while the Bordeaux mixture was used at the other places. For the *second* application Bordeaux was used at all places, while, for the *third, fourth, fifth* and *sixth* spraying a mixture of Bordeaux and Paris green was applied.

WINDSOR—NORTH ESSEX.

- 1st—April 25th—Fine, clear and warm. Trees rather close together.
 2nd—May 6th—Rain from noon until 2.30 p.m.; an hour later spraying was done; rain again at night. Buds in some varieties about fully opened; foliage looking well; fine show of bloom.
 3rd—May 20th—Clear, fine but cold. Foliage looking fairly well; hurt very little with the frost; bloom all off; early varieties injured by frost; later varieties but slightly injured.
 4th—June 3rd—Clear and very warm. Foliage looking good; no sign of spot on leaf or fruit; a little showing on trees not sprayed.
 5th—June 14th—Clear, warm and windy. Foliage good; the spot showing quite bad on trees not sprayed; very little, if any, on the sprayed trees.
 6th—June 26th—Clear, fine and warm. Foliage looking good; spot showing bad on trees not sprayed; very dry and warm.

I inspected the orchard of Mr. Hypolite Malleoux on the 29th of August, in company with Mr. John Craig, Horticulturist Experimental Farm, Mr. Clinton and Mr. McNeill of Windsor. I found the orchard in a good state of cultivation, and lying along the shore of the St. Clair river. The trees were too closely planted for best results; the sprayed trees showed a more healthy foliage than the unsprayed; very little fruit, but what there was on the sprayed trees were quite free from scab, larger in size and more perfect in form and color. The early frost had evidently done its work, as you will notice by the experimenter's remarks when making the second application. He says: "Fine show of bloom." The neighboring orchards at the time of my inspection were not showing a healthy foliage. Varieties sprayed: Northern Spy, Snow and Russets.

KINGSVILLE—SOUTH ESSEX.

- 1st—April 26th—Cool, cloudy and high wind. Very difficult to get the work thoroughly well done on account of the wind.
 2nd—May 7th—Showers in the forenoon; cleared up; did the spraying in the afternoon. Only a sparse show of bloom in the orchard sprayed; the bud moth at work on the peach here.
 3rd—May 21st—A severe frost; clear and cold the day before; prospects fair to-morrow. Foliage appears slightly damaged by the frost; bloom about all off, and injured more or less by the frost.
 4th—June 4th—Rain at 6 p.m. Foliage good; no sign of spot on leaf or fruit; a little on trees not sprayed; very little fruit in the orchard.
 5th—June 15th—Clear, fine and very warm. Foliage could hardly look better; farm crops looking well.
 6th—June 27th—Clear, fine and very warm. Foliage grand; no sign of spot on trees sprayed, and very little on those not sprayed.

Inspected Mr. J. D. Wigle's orchard on the 29th of August. Orchard in high state of cultivation and well pruned; while the foliage on the unsprayed trees were not seriously affected, the sprayed trees presented in a marked degree a rich and healthy color and a fine growth of wood; the fruit clean and bright and of larger size than on the unsprayed trees of the same variety. Mr. Wigle informed me he had used the Bordeaux on plum trees with very good results. The varieties sprayed in the orchard were Canada Red, Rhode Island Greenings, Russet, Wagener and Baldwin.

BLENHEIM—E. KENT.

- 1st—April 27th—Cold, cloudy and high wind. A high wind, but succeeded in applying the solution quite evenly.
 2nd—May 8th—Clear and fine; rain the night before. Buds not quite so far advanced, just about right for the second application; very little show for bloom.
 3rd—May 22nd—Clear, fine and very warm, with high wind. Mr. Cameron sprayed the balance of his orchard, not leaving any; but after the first spraying he left the next row to the sprayed trees; only a little bloom in this orchard, and that damaged badly by frost.

4th—June 5th—Cloudy and cool ; rain this morning. Foliage looking fairly good ; no sign of spot on the trees sprayed ; a very little on those not sprayed ; only a tree or two with fruit ; very few insects ; peaches were all injured by the frost.

5th—June 17th—Clear and fine, with high wind. Foliage good ; very little sign of spot ; very little fruit here ; they commenced cutting clover to-day.

6th—June 28th—Clear and cooler. Foliage good ; no sign of spot on leaf or fruit ; very dry here.

Inspected the orchard of Mr. Cameron on the 30th of August and found the foliage on the sprayed trees more healthy than on those not so thoroughly treated ; very few apples here. The frost and the drouth had left little to report upon.

CHATHAM—WEST KENT.

1st—April 24th—Clear, bright and windy. Buds nearly ready to open. This orchard was sprayed last year.

2nd—May 9th—Clear and warm. Nearly in full bloom and foliage good ; only a few of the sprayed trees show any bloom. Trees too close together to spray evenly.

3rd—May 23rd—Clear and warm. Foliage looking fairly well. Bloom all off and the fruit injured by the frost of the 21st inst ; two-thirds at least destroyed. Peaches, plums, cherries, grapes and currants all destroyed.

4th—June 6th—Clear and cool. Foliage good ; no fruit on sprayed trees nor sign of spot on foliage ; an insect here working on the black currant.

5th—June 18th—Clear and very warm. A. H. Pettit present and had a photograph taken of the work in progress. Foliage looking very good.

6th—June 29th—Clear and cool. Foliage good, nor sign of spot on leaf or fruit ; very dry here.

I inspected the orchard of Mr. Dolson, Chatham, County Kent, on the 9th of October and found the foliage good throughout his orchard. Mr. Dolson sprayed this orchard last year and once this year. When he saw no fruit he discontinued the work. He had a few Northern Spys, Twenty Ounce and Yellow Belle-fleur in another orchard. They were more or less ill-shapen and somewhat scabby. The orchard had been top-dressed with farmyard manure and the trees well pruned, but had been planted too near together.

APPIN—WEST MIDDLESEX.

1st—April 29th—Clear and warm. A fine day for the work.

2nd—May 10th—Clear, warm and windy. The trees are too close together a good show of bloom.

3rd—May 25th—Clear, warm and high wind. Foliage slightly injured by the frost ; at least two-thirds of the fruit destroyed, and plums and cherries nearly a total loss.

4th—June 7th—A slight frost this morning ; clear fine and cool. Foliage looking fairly well ; quite a few apples on some of the trees.

5th—June 19th—Cloudy, close and hot ; a light shower in the morning ; like rain again. Foliage good ; very little spot on fruit or foliage, but quite a little on the unsprayed trees ; crops looking fairly good, but rain badly needed here.

6th—July 4th—Clear and cool. Foliage in good condition ; no sign of spot on leaf or fruit, and very little on those not sprayed.

Inspected the orchard of Alexander McDonald, Appin, County of West Middlesex, on 10th of October. Foliage fairly good, crop very light and pretty free from scab. Some damage by the codling moth. This orchard was sprayed last year with Paris green and this year with Bordeaux. Here and there a tree was left in the experimental block, and a slight improvement in foliage and size of fruit was all that could be claimed.

AYLMER—ELGIN.

1st—April 30th—Clear, fine and warm. An uneven lot of trees ; some quite old. A fine day for the work.

2nd—May 11th—A high wind and showers throughout the day. Buds in bloom ; foliage good, rain immediately after the spraying.

3rd—May 27th—Cloudy, cold and high wind. Foliage looking fairly well ; all kinds of fruit here damaged by the frost.

4th—June 8th—Clear, fine and very warm. Foliage in good condition ; very little fruit on the trees here.

5th—June 20th—Cloudy ; a very slight shower. Foliage looking well, the spot showing a little on the unsprayed trees.

6th—July 3rd—Clear, fine and very dry. Foliage good ; no sign of spot on the leaf, and very little on the unsprayed trees.

Inspected the orchard of Francis Leeson, Aylmer, County of Elgin, on 11th of October. The orchard in pasture. The foliage on the sprayed trees showed a richer color than on the unsprayed, and the fruit quite free from scab.

SIMCOE—NORFOLK.

1st—May 1st—Clear and fine ; windy. Buds just opening here, and at the request of Mr. Trinder and all the others, sprayed a few trees in the old orchard as well as the young orchard.

2nd—May 13th—Clear, cold and a high wind. Frost has done great damage here. The foliage on the hickory, walnut, oak and some other varieties are a dark brown color as if singed by fire ; grapes, cherries and plums all gone.

3rd—May 28th—Clear, fine and warm ; a slight frost this morning. Foliage here badly singed by the frost and fruit about a total loss.

4th—June 10th—Clear, fine and very warm. Foliage improving very much since the frost ; you can see quite a difference in the foliage on the sprayed and unsprayed trees, but very little fruit left.

5th—June 21st—A slight shower in the forenoon, cleared up. Foliage looking well on most of the trees ; some have not recovered from the frost.

6th—July 4th—Fine and warm, with high wind. No sign of spot on the leaf on sprayed trees, and very little on the unsprayed.

Inspected the orchard of Mr. Trinder, Simcoe, County Norfolk, on the 11th of October, and found very little to report. Foliage fairly good, but the frost had been too severe, followed by drouth, rendered impossible any result.

JARVIS—HALDIMAND.

1st—May 2nd—Clear, fine and warm. A young orchard about twenty years old, in sod, but not an old sod.

2nd—May 16th—Clear and fine. Messrs. Ionson and Miller did the spraying on the 16th ; the day I was here, the 14th, it was snowing all day.

3rd—May 29th—Clear, warm, with quite a breeze. Foliage on some of the trees looking very well ; on others not so slightly injured by frost ; very few apples ; some walnut trees that I was examining to-day look as if they were entirely killed.

4th—June 11th—Clear, warm, and quite a wind. Foliage improving on most of the trees, a few showing the effects of the frost ; the spot showing on the unsprayed trees ; none on the sprayed trees.

5th—June 22nd—Clear, warm, and quite a breeze. Foliage looking very well.

6th—July 5th—Clear, fine and high wind. Foliage looking very fair, some of the leaves beginning to curl, caused by the drouth ; very dry here.

Inspected Mr. Ionson's orchard, Jarvis, County of Haldimand, October 12th ; found the foliage somewhat better on the sprayed than on the unsprayed trees, the fruit more perfect in form and color, and of larger size on the sprayed trees. The frost and drouth has been too severe to expect any very favorable results.

MARSHVILLE—MONCK.

1st—May 3rd—Warm, but a shower an hour after spraying. This orchard is cultivated and well pruned.

2nd—May 15th—Clear, but cold wind. Buds looking quite fresh, a good show of bloom.

3rd—May 30th—Clear, fine and warm. This orchard does not appear to be so badly damaged by frost the Baldwins, Russets and Spys are showing a fine crop.

4th—June 12th—Clear and warm, a slight shower, 9 p.m. Foliage looking very fresh and fine, very little sign of spot on leaf or fruit.

5th—June 24th—A shower in the morning, cleared up, and then sprayed. A fine show of apples here, no sign of spot on fruit or foliage and very little on the unsprayed trees.

6th—July 6th—Clear, fine, and a high wind. Foliage here looking very fine and of good color ; fruit fine and most of the trees well loaded.

Inspected the orchard of Mr. J. W. Overholt near Marshville in the County of Monck on the 8th of October; the foliage fairly good and the crop of apples very heavy, of good color, almost entirely free from scab and damage by the codling moth; the fruit of medium size caused by the abundant crop and the drouth. Mr. Overholt said he was convinced from the first spraying that there was business in it. He purchased the pump and sprayed the whole orchard, and is more than pleased with the results. The apples in an adjoining orchard and same kind of soil were more scabby and a larger number stung with the codling moth.

WELLAND—WELLAND.

1st—May 4th—Clear and very warm. About half of the orchard cultivated, the trees were pruned and the trunks scraped clean.

2nd—May 16th—Clear and cold. Another slight frost this morning, apparently little damage done except to early varieties; grapes destroyed.

2rd—May 31st—Clear and warm. The foliage in this orchard fairly good. Baldwins, Russets and some other varieties from one-third to one-half destroyed by frost.

4th—June 13th—Clear in the morning, rain in the afternoon. Mr. Reuter sprayed the trees again on the 17th inst., the weather clear and fine but windy.

5th—June 25th—Clear, fine and warm. Foliage good, very little sign of spot on the sprayed or unsprayed trees.

6th—July 8th—Rain all day. Mr. Reuter will make the application when the weather fines up. Fruit and foliage looking fairly good.

Inspected Mr. Reuter's orchard near Welland on the 8th of October and found the foliage good; some three or four trees of the "Seek no Further" not so good; Baldwin and Rhode Island Greenings were fine in foliage, the fruit of even size and good color, free from scab and damage by the codling moth, much more so than on the unsprayed trees.

THEDFORD—LAMBTON.

1st—April 26th—Windy. Got the work well done considering the high wind.

2nd—May 8th—Very warm. Foliage pretty well advanced, fruit buds beginning to open.

3rd—May 21st—Fine and some wind. The tops of the trees appear to be injured by the frost; fruit prospects very light.

4th—June 3rd—Fine and warm. Foliage good, no signs of scab.

5th—June 14th—Fine. Foliage fair, no signs of scab on fruit or leaf; fruit prospects very light.

6th—June 26th—Fine. No change.

Inspected the orchard of Mr. John Davidson, Thedford, County of Lambton. The foliage on the sprayed trees was much more luxuriant than on the unsprayed. The crop was light on account of the frost, yet the fruit was entirely free from the scab, and would grade largely No. 1. Mr. John Davidson reports to me as follows, date Nov. 16th: "I have picked my apples and took particular notice of the percentage of first-class, and as near as I can judge there were seven-eighths of them free from any blemish."

CLINTON—HURON.

1st—April 27th—Fine, but windy. Condition of the orchard good.

2nd—May 9th—Fine. Condition of the foliage and fruit buds fair.

3rd—May 22nd—Fine, but windy. The foliage appears injured by the frost.

4th—June 4th—Rain and wind. The weather was unfavorable for the work on the 4th, and Mr. Weir made the application on the 6th when the weather was fine; foliage fair, no sign of scab.

5th—June 15th—Fine. Found several nests of caterpillars on trees that had not been sprayed.

6th—June 27th—Rain in the morning, but cleared up fine. Foliage good; quite a few apples stung with the codling moth on the unsprayed trees, but none on the sprayed trees.

Inspected the orchard of Mr. Weir near Clinton in the County of Huron. His orchard is in a good state of cultivation and well manured with farmyard manure. I could not say I saw any marked difference in the sprayed and unsprayed trees, and only here and there an apple could be found. The foliage was still well covered with the Bordeaux.

WALKERTON—BRUCE.

- 1st—April 29th—Fine. Orchard in sod, trees about 30 to 35 years old.
 2nd—May 10th—Clear and very warm. Foliage fairly good.
 3rd—May 23rd—Fine but windy. Foliage withered looking and very little show of fruit.
 4th—June 5th—Fine and very windy. Quite a heavy shower one hour after the spraying; foliage badly injured by the frost.
 5th—June 17th—Fine. Foliage not very good; very dry here.
 6th—June 28rd—Rained in the morning, but cleared up fine again. Some wormy apples on the unsprayed trees, but none on the sprayed; very little fruit here.

Inspected Mr. David Smith's orchard, Walkerton, on the 18th of September. The foliage on the sprayed trees showed a richer color than on the unsprayed, although not very marked. The frost had evidently been quite severe in this locality, and the long continued drouth immediately following had very much lessened the vitality of the trees. Here and there only could an apple be found; they were quite free from scab and insect. The orchards in the vicinity showed the same unfavorable appearance.

MOUNT FOREST—WEST WELLINGTON.

- 1st—April 30th—Fine. Orchard in sod.
 2nd—May 11th—Rain soon after the spraying. Foliage fair; fruit buds beginning to open.
 3rd—May 25th—Fine, but rained during the night. Foliage fair, but the prospects for fruit not very abundant.
 4th—June 6th—Cold and drizzling rain. Foliage fair; no sign of spot on the fruit or foliage.
 5th—June 18th—Fine. No change apparent.
 6th—June 29th—Fine. Foliage good; no sign of the scab on fruit or foliage; Mr. Stewart sprayed his whole orchard; one row left.

Inspected Mr. David Stewart's orchard, Mount Forest, County of Wellington, on the 19th September. The foliage on the sprayed, although showing signs of the frost, were of a rich green color—more so than on the unsprayed. The frost here occurred while many varieties were in full bloom; the Spy being a little later escaped almost uninjured. Result, a fairly good crop of this variety; the sample quite free from scab, of fair size and good color. Some Baldwins also of good size and color, quite free from scab. The unsprayed row was not nearly so good. This orchard will show quite plainly the advantage to be gained by a thorough application of the Bordeaux mixture.

OWEN SOUND—GREY.

- 1st—May 1st—Fine. The orchard in fair condition as to cultivation and pruning; a large number of people out to witness the work.
 2nd—May 13th—Fair and cold. The foliage not quite so much advanced as the other points.
 3rd—May 27th—Dull and looking like rain. Foliage good, and prospects of fruit very fair.
 4th—June 7th—Fair. Foliage good; no sign of scab on fruit or foliage; orchard in fine shape.
 5th—June 19th.
 6th—July 2nd—Fair. Foliage good; no sign of scab on fruit or foliage; quite a few stung with the codling moth on the unsprayed trees.

Inspected the orchard of Mr. John Kilborne, Owen Sound, September 20th. The foliage in very good condition, and fairly so on the unsprayed trees. The fruit quite free from the scab and also the effects of the codling moth. Here were conditions quite favorable for fungi—soil quite rich, and the orchard sheltered, being in a valley. On the unsprayed trees we found some affected with the scab, and quite a few stung by the codling moth.

MEAFORD—NORTH GREY.

- 1st—May 2nd—Fine. Orchard in good cultivation.
 2nd—May 14th—Cold and snowing all day. Foliage backward.
 3rd—May 28th—Fine. Foliage good; fair prospects for fruit.

- 4th—June 8th—Fine. Foliage good ; no sign of spot on leaf or fruit.
 5th—June 20th—Fine. Foliage good ; no sign of spot on leaf or fruit.
 6th—July 3rd—Fine. Foliage fine.

Inspected Mr. Plunkett's orchard September 20th, and found the trees in a very healthy condition throughout. He had sprayed all his orchard. He had a fine crop throughout, free from scab and damage by the codling moth. Some varieties such as the Snow, that are very susceptible, were entirely free.

Mr. Plunkett's statement of percentages : Spys, seven trees, about three per cent. stung, and seven per cent. small and unfit for market, owing to the crowded state of the trees ; Russets, four trees, ten per cent. stung, all a poor sample, trees overcrowded ; Baldwins, one tree, about three per cent. stung, all good sample throughout ; Seeks, three trees, good sample, none stung ; three Greenings, good sample, none stung ; one Alexander, good sample, two per cent. stung ; one Wagener, good sample, three per cent. stung. Mr. Plunkett says : I would remark here, my Russets on all my other trees were a poor sample and appeared to be only half grown, while the Baldwins were very large and good. I cannot here draw a comparison between the twenty trees sprayed by your man and the rest of the orchard, as I sprayed five times. I do remember, however, some ten years ago, before spraying was practised, the codling moth had the big half.

COLLINGWOOD—EAST GREY.

- 1st—May 3rd—Fine but windy. Orchard in good state of cultivation and well pruned.
 2nd—May 15th—Cold. Buds, I fear, nipped by the frost.
 3rd—May 29th—Fine and very warm. Caught pretty bad with the frost ; prospects for fruit light.
 4th—June 10th—Fine. Foliage good ; no sign of spot on leaf or fruit ; very dry here.
 5th—June 21st—Fine. Foliage good.
 6th—July 4th—Fine but windy. Foliage good ; no scab ; orchard looking fine ; can see quite a difference in the foliage and also in the fruit on the sprayed trees.

Inspected Mr. William Marshall's orchard near Collingwood on the 20th of September. His trees are in a fine healthy condition, and producing a fine crop of clean fruit, free from scab and codling moth. Colverts, Ribstons, St. Lawrence and Greenings beautiful in form and color, showing good results of the spraying, and also of manuring and cultivation for several years.

BARRIE—WEST SIMCOE.

- 1st—May 4th—Fine and warm. Orchard in sod but well pruned.
 2nd—May 16th—Windy and cold. Foliage fair ; buds somewhat discolored by the frost.
 3rd—May 30th—Fine and very warm. Foliage good ; prospects for fruit fair.
 4th—June 11th—Fine but windy. Foliage good ; no sign of scab on fruit or leaf ; fruit looking splendid.
 5th—June 22nd—Heavy shower about seven hours after spraying. Good fair show of fruit.
 6th—July 6th—Fair but windy. Foliage good ; no scab ; the sprayed trees look better than the unsprayed.

Inspected Mr. Lloyd's orchard Sept. 21st, Barrie, county of West Simcoe. Foliage in a fine healthy condition, quite free from brown spot ; the fruit of medium size on account of the extreme drouth, but very good in color and entirely free from scab and the codling moth. The fruit was somewhat damaged by a local hail-storm. The Tetofsky and Duchess, Mr. Lloyd informs me, were a very good crop and free from scab and codling moth. They had been marketed. The unsprayed trees in the orchard showed a paler leaf and the scab to some extent.

ORILLIA—EAST SIMCOE.

- 1st—May 6th—Fine. Cultivation very good.
 2nd—May 17th—Fine. Foliage fair.
 3rd—May 31st—Fine and warm. Foliage very good and fruit prospects fair.
 4th—June 12th—Fine. Foliage good ; no sign of scab on fruit or leaf.
 5th—June 24th—Fine. Foliage fine ; no signs of fungus.
 6th—July 6th—Fine. Foliage splendid ; far ahead of the unsprayed trees.

Inspected the orchard of Mr. Wellington Fisher, near Orillia, in the county of East Simcoe. Found the sprayed trees looking exceedingly fine in foliage and the fruit quite free of the apple scab and of good size and color, in fact some beautiful specimens. Here I found good cultivation and pruning, and a fine growth of wood.

NEWMARKET—YORK.

- 1st—May 7th—Showery. Fairly pruned, sod well manured.
- 2nd—May 18th—Fine, but rained two hours after spraying. Foliage fair.
- 3rd—June 1st—Fine and very warm. Foliage fair, fruit prospects not very good.
- 4th—June 13th—Fine. Foliage fair, no appearance of the scab.
- 5th—June 25th—Fine. Foliage fair, no appearance of the scab.
- 6th—July 8th—Fine. Foliage good, no sign of scab on the sprayed trees; they look much greener in color than on the unsprayed.

Inspected the orchard of Mr. Silas Armitage, near Newmarket, in the county of York, on the 15th of October. The foliage on the sprayed trees was of a better color than on the unsprayed trees. There was little difference in the fruit; less fungi perhaps on the sprayed trees. The fruit had all been picked and put in the barn at the time of my visit.

WHITBY—ONTARIO.

- 1st—April 29th—Fine. Orchard two years in sod. Pump did not work freely.
- 2nd—May 10th—Fine. Foliage good, fruit buds just opening.
- 3rd—May 25th—Fine. Foliage good, fair show of fruit, the pump had been overhauled and works good.
- 4th—June 6th—Fine. Foliage good, fair crop.
- 5th—June 18th—Fine. Foliage good.
- 6th—July 2nd—Windy. Foliage good, fruit free from scab.

Inspected Mr. Howden's orchard, Whitby, county of Ontario, on the 5th of October. The foliage in this orchard is very good and the fruit quite clean and of good size. If there is any difference to be noted here, the fruit on the sprayed trees are less injured by the codling moth.

BOWMANVILLE—WEST DURHAM.

- 1st—April 30th—Windy. Orchard two years in sod.
- 2nd—May 11th—Rain in the forenoon again after spraying. Foliage good, not many fruit buds.
- 3rd—May 27th—Cold and windy. Foliage good, promise of about one-quarter of a crop.
- 4th—June 7th—Fine. Foliage good.
- 5th—June 19th—Fine. Foliage good.
- 6th—July 3rd—Fine. Fruit clear of scab.

Inspected Mr. Joseph Jeffrey's orchard, near Bowmanville, on the 5th of October, the whole of the orchard had been sprayed, the foliage fairly good throughout, but not of a rich color, the orchard in meadow would account for this. Of the experimental trees, some two of the Yellow Belle-fleur trees had a moderate crop, the fruit clean and bright. Mr. Jeffrey said they had been badly affected with fungi for a number of years. He had sprayed some Flemish Beauty pears with good results.

COBOURG—WEST NORTHUMBERLAND.

- 1st—May 1st—Windy. Orchard in good cultivation.
- 2nd—May 14th—Windy. Fruit buds just beginning to open.
- 3rd—May 28th—Windy, Foliage good and prospects of fruit good.
- 4th—June 8th—Fine. Foliage good.
- 5th—June 20th—Fine. Foliage good and a fine show for fruit.
- 6th—July 4th—Fine. Foliage good; crop good and clean from the apple scab.

Inspected the orchard of Mr. W. H. Morton, near Cobourg, in the county of Northumberland, on the 4th of October. I found the orchard in good state of cultiva-

tion and the foliage very good ; a beautiful crop of fruit. Mr. Morton was not at home, but I copy the following from a statement he sent me under date November 4th. He says : " I am late about writing you about the spraying. I give you Mr. Wilson's views (the buyer). He says : ' They are much larger, freer from spots and worms.' I have seen one lot of twenty-two barrels, and there was only one barrel of culls ; there was twice or three times that many on the trees not sprayed."

BELLEVILLE—WEST HASTINGS.

- 1st—May 2nd—Fine. Orchard in meadow for seven years.
- 2nd—May 14th—Windy, rain three hours after spraying. Foliage good ; nearly in bloom.
- 3rd—May 29th—Fine. Foliage good ; bloom all off.
- 4th—June 10th—Fine. Foliage good ; about half crop of fruit.
- 5th—June 21st—Fine. Foliage good ; half crop clean and free from spot.
- 6th—July 5th—Fine. Foliage good ; half crop, clean and free from spot.

Inspected the orchard of Mr. John Aris, near Belleville, in the county of Hastings. The foliage good but not rich in color ; the orchard has been too long in meadow, and the dry season greatly lessens the vitality of the trees ; the fruit on the sprayed trees was very free from the apple scab and almost entirely free from damage by the codling moth, while the unsprayed trees were more or less affected and the fruit of smaller size.

NAPANEE—LENNOX.

- 1st—May 3rd—Fine. Orchard in good state of cultivation and well pruned.
- 2nd—May 15th—Rain in the morning. Foliage good ; nearly in bloom.
- 3rd—May 30th—Fine. Foliage fair.
- 4th—June 11th—Windy. Foliage fair.
- 5th—June 22nd—Fine. Foliage good.
- 6th—Work not done.

Inspected the orchard of Mr. C. W. Hambly, near Napanee, on the 3rd of October. Foliage good ; the American Golden Russetts entirely free from scab ; some Ben Davis were also sprayed ; they also showed good foliage and a beautiful crop of clean, high colored specimens.

CATARAQUI—FRONTENAC.

- 1st—May 4th—Rain in the morning. Fine. Orchard in sod.
- 2nd—May 16th—Fine. Foliage not good.
- 3rd—May 31st—Fine. Foliage does not show a healthy appearance ; crop prospects light.
- 4th—June 12th—Windy. Foliage not very good.
- 5th—June 24th—Windy. Foliage not very good.
- 6th—July 8th—Fine. Foliage improved in appearance and promise of half a crop.

Inspected the orchard of Mr. Lancaster, Cataraqui, near Kingston, on the 3rd of October. Foliage very good ; much better than on the unsprayed trees. The Russetts and Spys almost entirely free from scab and of good size and color ; one row of the La Rue had been picked and blown off by a high wind. Mr. Lancaster stated the fruit was very clean and fine, and the foliage was very fine indeed.

GANANOQUE—SOUTH LEEDS.

- 1st—May 6th—Fine. Orchard in sod.
- 2nd—May 17th—Fine. Foliage good ; some trees are showing bloom, others not.
- 3rd—June 1st—Fine. Foliage good ; crop prospects fair.
- 4th—June 13th—Windy. Foliage good ; crop prospects fair.
- 5th—June 25th—Windy. Foliage good ; crop prospects fair.
- 6th—July 9th—Windy. Foliage good ; scab showing on the unsprayed trees.

Inspected the orchard of Mr. J. M. Cornett, Gananoque, and found the foliage and also the fruit much better on the sprayed than on the unsprayed trees. The American

Golden Russetts and Ben Davis were almost entirely free from scab and the fruit of good size and color; the soil I should say in this orchard was very shallow and the rock near the surface; some of the unsprayed trees showed the effects of the drouth; the unsprayed Ben Davis were quite scabby and the Russetts also, and small in size, and many were worthless; at this point we experienced some difficulty; the first spraying was done with a small hand pump on account of the non-arrival by freight of the one intended, and for the third spraying Mr. Cornett was requested to apply the solution. Mr. Konkle, the experimenter, was called home on account of his sister's death.

BROCKVILLE—BROCKVILLE.

- 1st—May 7th—Pump did not arrive and none could be found for the occasion.
 2nd—May 18th—Windy. Foliage not very good; some bud moths here, and some trees quite in bloom; orchard in pasture.
 3rd—June 3rd—Rain in the morning. Foliage fair, prospects one-third crop.
 4th—June 14th—Windy. Foliage fair, prospects one-third crop.
 5th—June 26th—Windy. Foliage good; half crop; fruit clear of scab.
 6th—July 10th—Windy. Foliage good; half crop; fruit clear of scab.

Inspected the orchard of Judge McDonald, in the town of Brockville, on the 2nd of October, found the foliage on the sprayed trees of richer color than on the unsprayed, the fruit quite free from scab or blemish by the Codling moth. The orchard is an old one, yet the foliage showed vigor in the trees. The Judge informed me they bore quite a heavy crop last year.

MORRISBURG—DUNDAS.

- 1st—May 8th—Rain in the morning; then fine. Orchard in sod.
 2nd—May 20th—Windy and cold. Bud moth doing some damage; some trees quite in bloom.
 3rd—June 4th—Fine. Foliage good; promise of a fair crop.
 4th—June 15th—Fine. Foliage good.
 5th—June 27th—Rain after spraying. Foliage good and fruit free from spot.
 6th—July 11th—Fine. Foliage good and fruit clean and free from scab.

Inspected the orchard of Mr. Henry Smith, near Morrisburg in the County of Dundas. Mackintosh Red, Duchess and Russetts were sprayed; the foliage exceedingly good, much better than on the unsprayed trees, the fruit also of larger size; of good color and free from blemish. The Duchess had been picked and marketed, but Mr. Smith informs me the crop was good, of clean smooth sample, all the Duchesses were sprayed, none left for comparison.

CORNWALL—CORNWALL.

- 1st—May 9th—Windy. Orchard in sod.
 2nd—May 21st—Fair. Foliage good; in bloom.
 3rd—June 5th—Rain in the morning; sprayed at 10 a.m.; rain again at 2 p.m. Foliage good; crop prospects good.
 4th—June 17th—Fine. Foliage good; crop prospects good.
 5th—June 28th—Fine. Foliage good; crop prospects good.
 6th—July 12th—Windy. Foliage good; crop good and clean of scab.

Inspected the orchard of Mr. Blacklock, East Front, Cornwall, and found very satisfactory results, the foliage on the sprayed trees was much darker in color than on the unsprayed, the fruit of good size and fine color. Mr. Blacklock informs me the St. Lawrence were exceedingly fine, they had been marketed, but the Fameuse were still on the trees, of fine size and color and scarcely a spot to be seen on those sprayed, while the unsprayed, although not as bad as in former years, some were scabby. The fruit on the sprayed trees were almost entirely free from the Codling moth.

Only a few years ago the idea as suggested by our scientists of spraying our orchards with the different solutions for the prevention and destruction of fungous diseases and insect enemies was considered by many as only a theory, and one not of practical application in a large orchard, but we find our manufacturers to the front with appliances whereby the work can be done speedily and thoroughly. We have to-day the strongest proof of the benefits of spraying. If you will carefully trace the results in my detailed report, you will see in nearly every point a marked improvement in the condition of the foliage. The health and vigor of the tree must be maintained if profitable results are to be expected. In making this report I have endeavoured to under-estimate rather than to magnify the results obtained, for the simple reason that we are liable sometimes to allow our prejudice as regards new methods to outweigh the real condition, and more particularly so in a season like the one just past, when this query is so often brought forward: "Why was my orchard that has never been sprayed so free from the fungus and insect enemies?" Few orchards have of late years been free in this respect. This theory may apply. The rapid development of fungus and insects caused by the extreme warm weather in early spring, followed by an unusually low temperature causing their destruction while in a tender stage of development, and this followed by a prolonged drouth perhaps not favourable to second growth. In some sections covered by the work where the temperature was very low the trees did not entirely recover from the shock, and in some other cases where orchards have been in sod and hay gathered, perhaps for years, we can scarcely expect a healthy foliage; but where good cultivation and pruning has been practiced we find the best results follow.

If there is one matter to-day in connection with fruit culture that should engage our most undivided attention, it is, in my opinion, the cultivation, pruning and spraying of our orchards, for in this, in nine cases out of ten—in production—the whole secret of success or failure depends, as sure as the night follows the day. Eternal vigilance is the price of good fruit and should be inscribed in letters of gold, as the motto, in the mind of every fruit grower in our land.

I have received many enquiries during the past season in regard to spray pumps, and those enquiries might be summed up in these words, "Which pump do you consider the best and the most desirable?" I will take this opportunity to reply, we have used during the past season five different makes, namely: The Aylmer, manufactured by The Aylmer Iron Works; The Parker Excelsior, manufactured in London, Ont.; The Ontario Wind Engine & Pump Co., Toronto; The Clarksburg Pump, manufactured by Holmes & Halliday, Clarksburg, and The Gould, Shapley and Muir Co., Brantford, the Ideal, and they all gave good satisfaction. Improvements are being continually made as practical experience shows is required. One of great importance, the "Mechanical Agitator," will cause better results to follow by the more even distribution of the fungicides and insecticides. The nozzle is another improvement. The Boss nozzle, that is still quite useful for washing buggies and windows, has given place to others of superior construction and that will produce the finest spray, or one of greater volume, as may be desired. As to durability, I am not sufficiently acquainted with the chemical action of copper sulphate upon the different materials used in the manufacture of spray pumps, but I am inclined to think that brass or brass lining would lessen the corrosive action better than iron. Much loss might be avoided by thoroughly rinsing out the pump with clear water before putting away after use.

I cannot close this report without expressing my unbounded confidence in the benefits that will accrue to the fruit grower who will most thoroughly apply the different fungicides and insecticides as recommended by our horticulturists and chemists, who are working along that line. Failures, I think, may be attributed to several causes; not applying at the proper time to check the spread, imperfectly prepared mixtures, too much guess work as to quantities, and last, but by no means least, *thorough agitation* during the whole application. If each ingredient is required to make the mixture perfect, it must be evenly and equally distributed to obtain the desired result. As the bud worm is becoming quite numerous in some sections, I would suggest, that instead of using copper

sulphate and water in the first spraying, the lime and Paris green be added. The same result would be obtained, and the lime would assist to fasten, as it were, the Paris green upon the bud and destroy the bud moth, perhaps, before it had destroyed the bud.

Some pointers along the line that often cause delays and hinder the work : Some little part of the pump not being inspected as carefully as it ought to have been before putting it together, and the fruit grower, not being an expert in that line, cannot discover the remedy until his patience has been severely taxed. Another, but more common occurrence is that after the tank has been filled and ready for business, it is allowed to stand, if only for a few minutes, the lime and Paris green quickly settle to the bottom ; then the first few strokes of the pump causes quantities of this to be sucked up from the bottom, the pump and nozzle become clogged, and the manufacturer sometimes comes in for a share of the blame. Remedy : shut off the stop cock and thoroughly agitate the solution before you commence to spray ; do not drench the tree but spray it, rinse the pump out thoroughly before putting away after using it, and don't buy a spray pump on account of its cheapness, but look for efficiency and durability. Time is money, and we can ill afford to loose much of it at the season of spraying our trees.

I have the honor to be, Sir,

Your obedient servant,

A. H. PETTIT.

APPENDIX B.

SPRAY PUMPS.

An exhibition of spray pumps was held at Grimsby on April 2nd, 1896, under the auspices of the Board of Control of the Fruit Experiment Stations. The preliminary arrangements were made by Mr. A. H. Pettit and Mr. L. Woolverton. Eight Canadian and three American pumps were exhibited.

The following information was prepared by Mr. H. L. Hutt, Horticulturist at the Ontario Agricultural College, Guelph, and Mr. Murray Pettit, Winona, President of the Ontario Fruit Growers' Association and manager of the Wentworth Fruit Experiment Station :

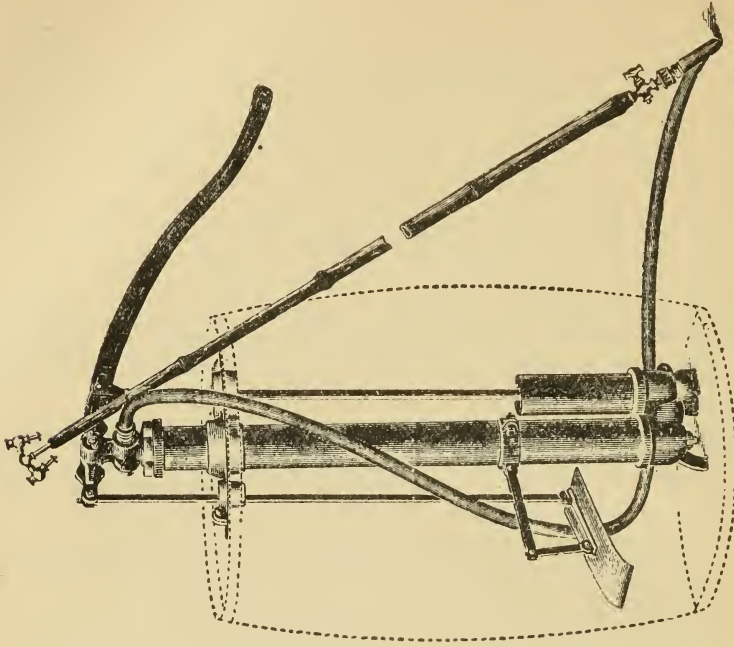
Considering that the manufacture of spraying outfits is a comparatively new industry, it must be acknowledged that great credit is due to the manufacturers for the effort they have made to meet fully the requirements of this new demand.

The appliances first used were more or less unsatisfactory, because makers were not aware of all that was needed to make a spraying outfit effective, handy, and durable. The improvement already made along this line has been rapid, and one of the greatest immediate results of this trial, we believe, will be the still further improvement of many of the pumps now offered for sale.

Makers who never before enjoyed the pleasure of spraying a row of large trees, in a cold, blustering wind, were brought face to face with some of the difficulties which fruit growers have to encounter, and could not but see wherein their outfits might be improved, and in what respects other makers were ahead of them. Those who experienced a wrestling match, trying to hold on the wagon a tall pump mounted on top of a barrel, while the horses plunged in the mud, and low-hanging limbs swept over them, could not but see that it was a decided advantage to have the pump low and compact, and mounted on the side of a barrel with a firm foundation. Others who were doused with Bordeaux mixture, splashing out of unnecessarily large openings in the barrel, could not but be impressed with the advisability of close-fitting covers to all such openings. Those who had to shake their barrels to stir the rapidly settling Bordeaux mixture, and who found, even then, that the first few trees received nearly all of the lime and copper-sulphate, while those at the other end of the row received water only, had ocular proof that their agitators were not all they had thought them to be. Those who when they came to spray trees thirty feet in height, had to hunt up poles to elevate their nozzles and heavy hose to the required height, will no doubt be quick to adopt some such convenience as the bamboo or gas pipe extension rod. The desirability, too, of easily operated stop-cocks on each extension rod was apparent to all who had to clean out choked nozzles or travel far from one tree to to another.

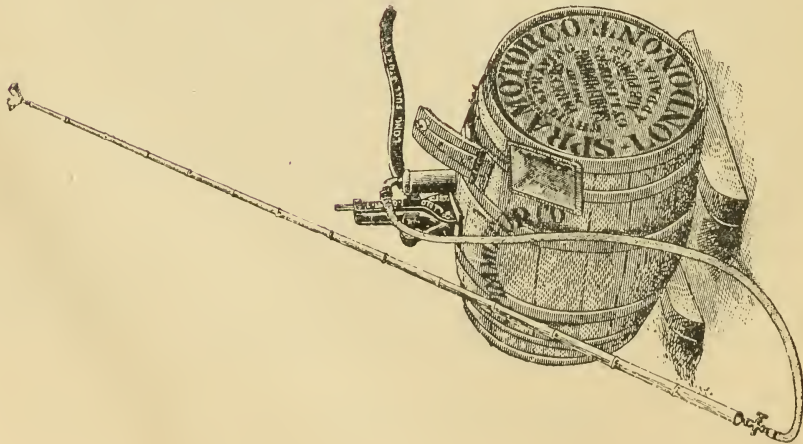
DESCRIPTION OF PUMPS.

The following illustrations and descriptions of pumps as exhibited, together with prices of the same, will be of interest to fruit growers :



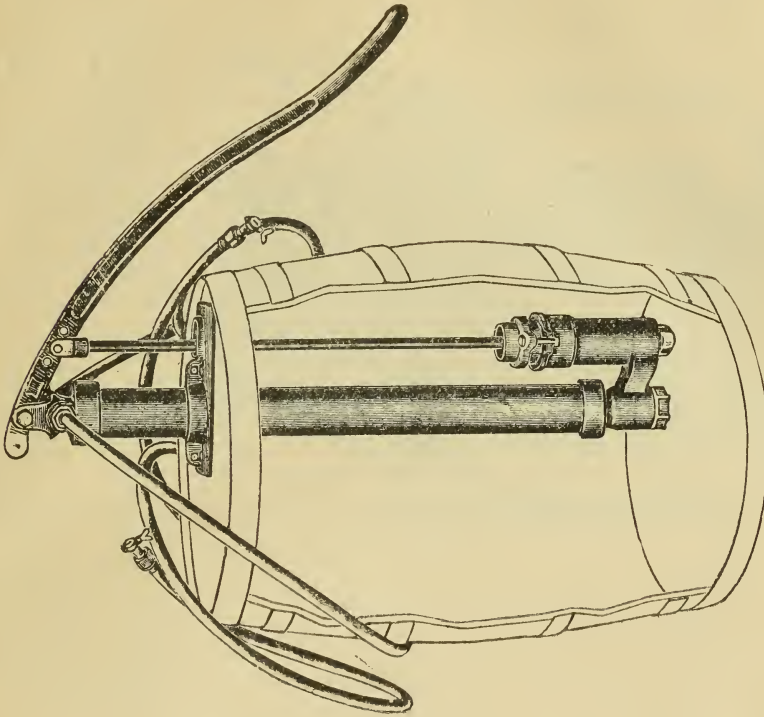
Eclipse No. 3.

Made by Morrill & Morley, Benton Harbor, Mich., U.S. Price without barrel, \$24. Pump mounted on end of barrel, all brass. Eclipse automatic agitator, one lead of hose, bamboo extension rod, double Vermorel nozzles.



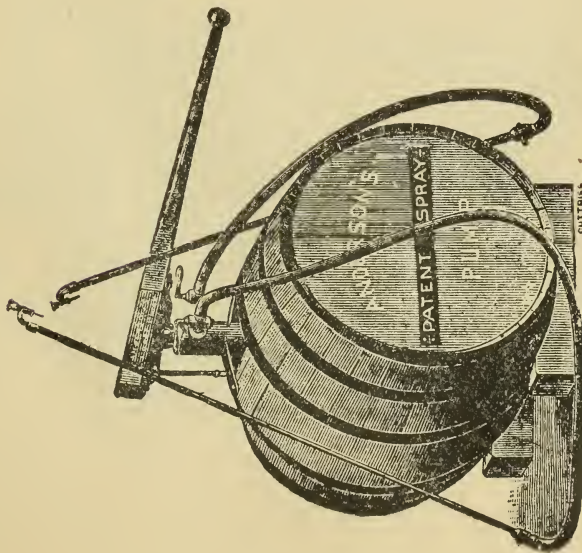
Spramotor No. 2 E.

Made by the Spramotor Co., London, Ont. Price without barrel, \$18.60. Pump mounted on side of barrel, working parts brass, dash agitator on suction pipe, one lead of hose, bamboo extension rod, three Spramotor nozzles.



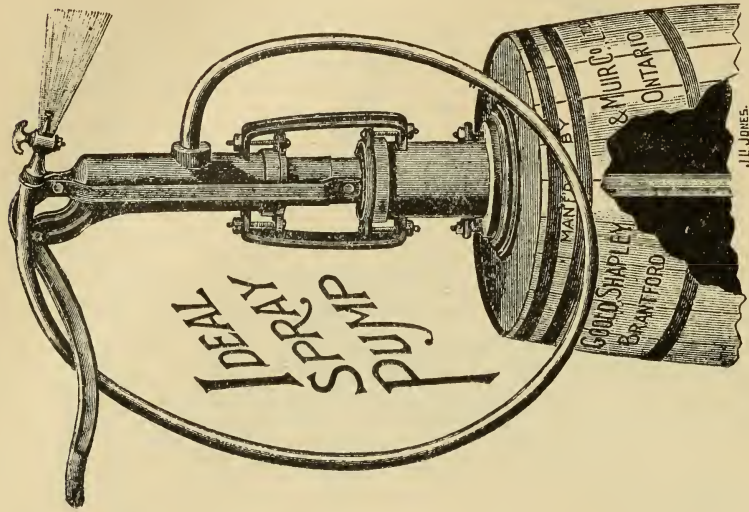
Pomona.

Made by The Goulds Manufacturing Co., Seneca Falls, N. Y. Price without barrel, \$15. Pump mounted on end of barrel, brass working parts, paddle agitator, one lead of hose, gas pipe extension rod, three Vermorel nozzles.



The Anderson Spray Pump.

Made by the Aylmer Iron Works, Aylmer, Ont. Price without barre, \$15.50. Pump mounted on side of barrel, all working parts brass, dash agitator attached to movable lower cylinder, two leads of hose, gas pipe extension rods, three Vermorel nozzles.

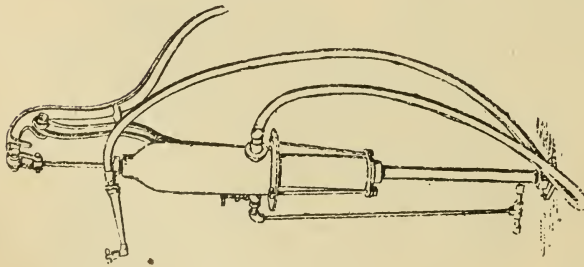


Ideal Spray Pump.

Made by Gould, Shapley & Muir Co., Brantford, Ont. Pump mounted on end of barrel, brass working parts, two leads of hose, McGowan and Vermorel nozzles.
 No. 1 "Ideal" Iron Pump with 7 feet $\frac{3}{4}$ inch rubber hose, galvanized pipe for depth of ordinary barrel, with strainer attached, and one Vermorel or McGowan nozzle, \$9.00.

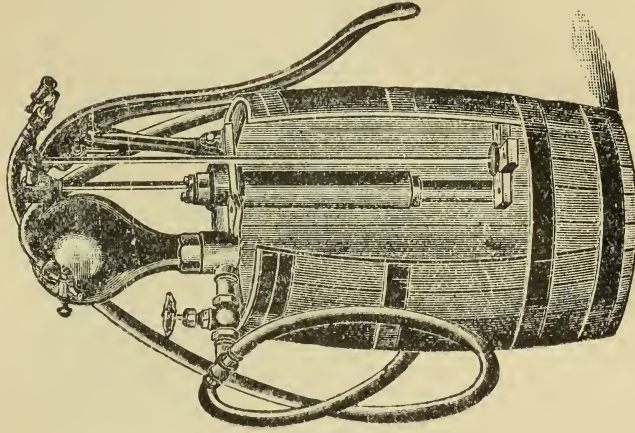
No. 2 "Ideal" Iron Pump with three-way brass stop-cock, two lengths of $\frac{3}{4}$ inch rubber hose and two nozzles, Vermorel or McGowan, selected, and galvanized pipe and strainer for barrel, \$11.00.

Brass Plunger, for either pump, extra, \$1.00. Dash Agitator, complete, extra, 75c.



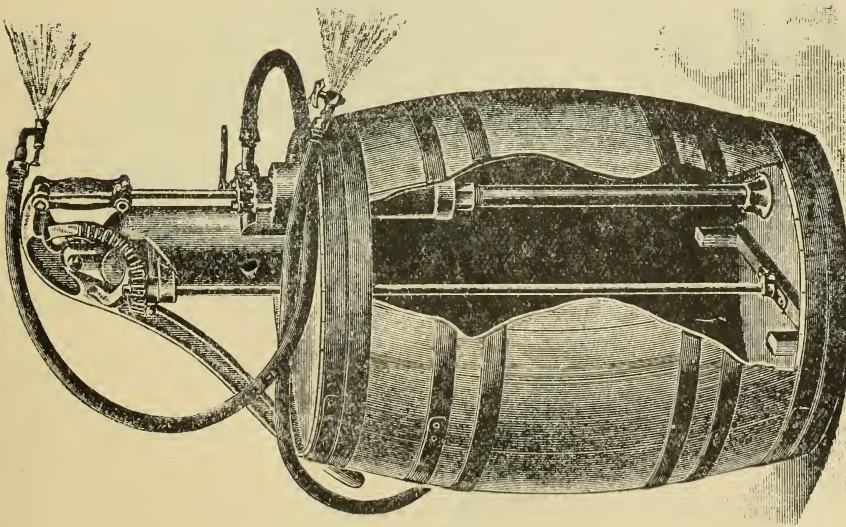
The Clarksburg Pump.

Made by Holmes & Holladay, Clarksburg, Ont. Price without barrel, \$13. Pump mounted on end of barrel, brass working parts, double dash agitator, two leads of hose, brass extension rod, two Clarksburg nozzles.



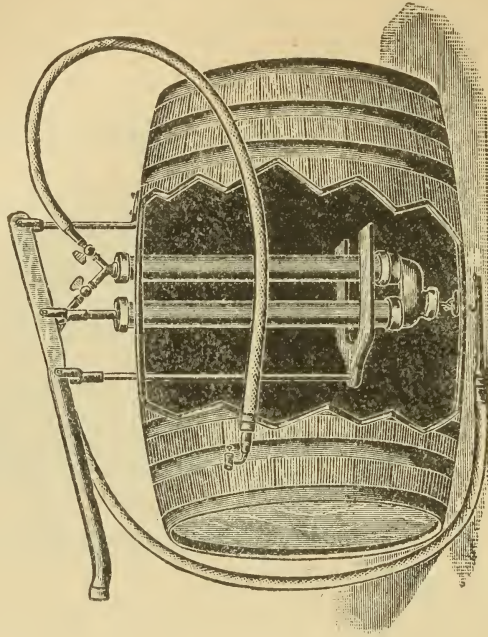
The Gem.

Made by The Ontario Wind Engine and Pump Co., Toronto, Ont. Price without barrel, \$16.50. Pump mounted on end of barrel, working parts brass, churn dash agitator, two leads of hose, McGowan and Vernorel nozzles.



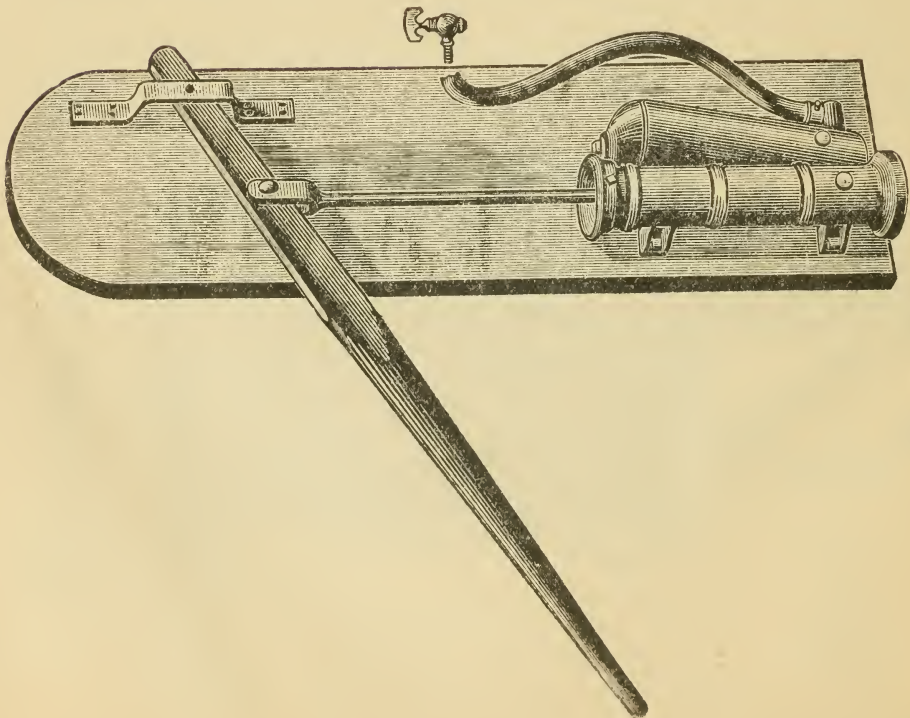
The Empire King.

Made by Field Force Pump Co., Lockport, N. Y. Price, \$14. Pump mounted on end of barrel, brass working parts, geared revolving agitator, one lead of hose, two Niagara nozzles.



The Defender.

Made by P. C. Lewis Manufacturing Co., Catskill, N. Y.
 Price, with barrel, ready for use, \$11.50. Pumps mounted
 on side of barrel, all brass, wooden dash agitator, two leads
 of hose, two Vermorel nozzles.



Reid's Spray Pump

Made by Thomas Reid, Hamilton, Ont. Price without barrel, \$5. Pump set
 in barrel on end, iron and wood, agitator a discharge at bottom of cylinder, two
 leads of hose, one gas pipe extension rod, one Vermorel and one Masson nozzle.

The Wilson Sprayer.

Made by the Rotary Spray Pump Co., London, Ont. Price complete, \$8. A garden pump consisting of a barrel attached to a wheelbarrow. Wooden rollers working over the hose cause suction, tin disc nozzle.

SUGGESTIONS AS TO THE BEST KINDS OF PUMPS.

The following suggestions will be of great importance to manufacturers, and should be of much use to fruit growers in selecting pumps for their use :

1. Pump should be furnished fitted to barrel, ready for use. The majority of fruit growers have not the facilities for mounting a pump properly.

2. Pump should be made as low as possible and mounted on the side of a barrel, fixed to blocks for support. This would prevent many an upset.

3. All openings in the barrel should be furnished with tight-fitting, convenient covers, both to prevent liquid from splashing out and to keep dirt out of the barrel.

4. Agitators should be made to agitate thoroughly the contents of a barrel full of liquid. Something on the dash principle is found to be the most effective. It is an advantage if the agitator can be worked independently of the pump, so as to agitate the liquid thoroughly before commencing to spray.

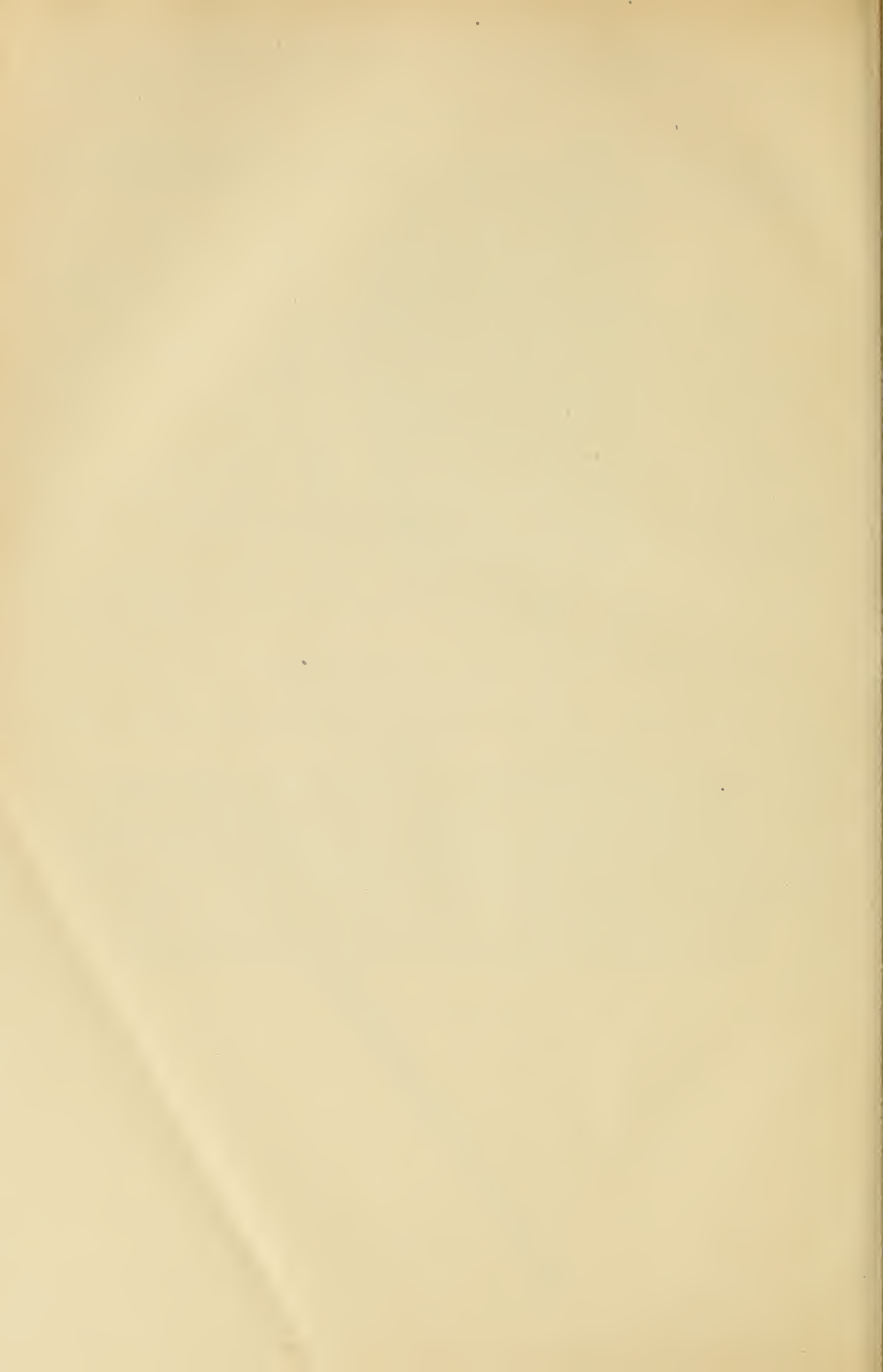
5. Each pump should be equipped so that one or two leads of hose may be used as desired. For overhead work, each lead should be at least twelve or fifteen feet long and made of good, four-ply, half-inch hose.

6. For use among large trees, each pump should be supplied with a light extension rod six or eight feet in length, of bamboo, brass or gas pipe.

7. The base of each extension rod should be furnished with a stop-cock which can be worked by hand. This is not only useful when cleaning the nozzles, but effects a saving of liquid when passing from one tree to another.

8. Only those nozzles which throw a very fine spray should be used. The improved double Vermorel nozzle, when used with a good extension rod, has not yet been surpassed even for large trees.

9. All metal parts of an outfit coming in contact with the mixture should be made of brass, in order that they may withstand the corrosive influence of copper sulphate.



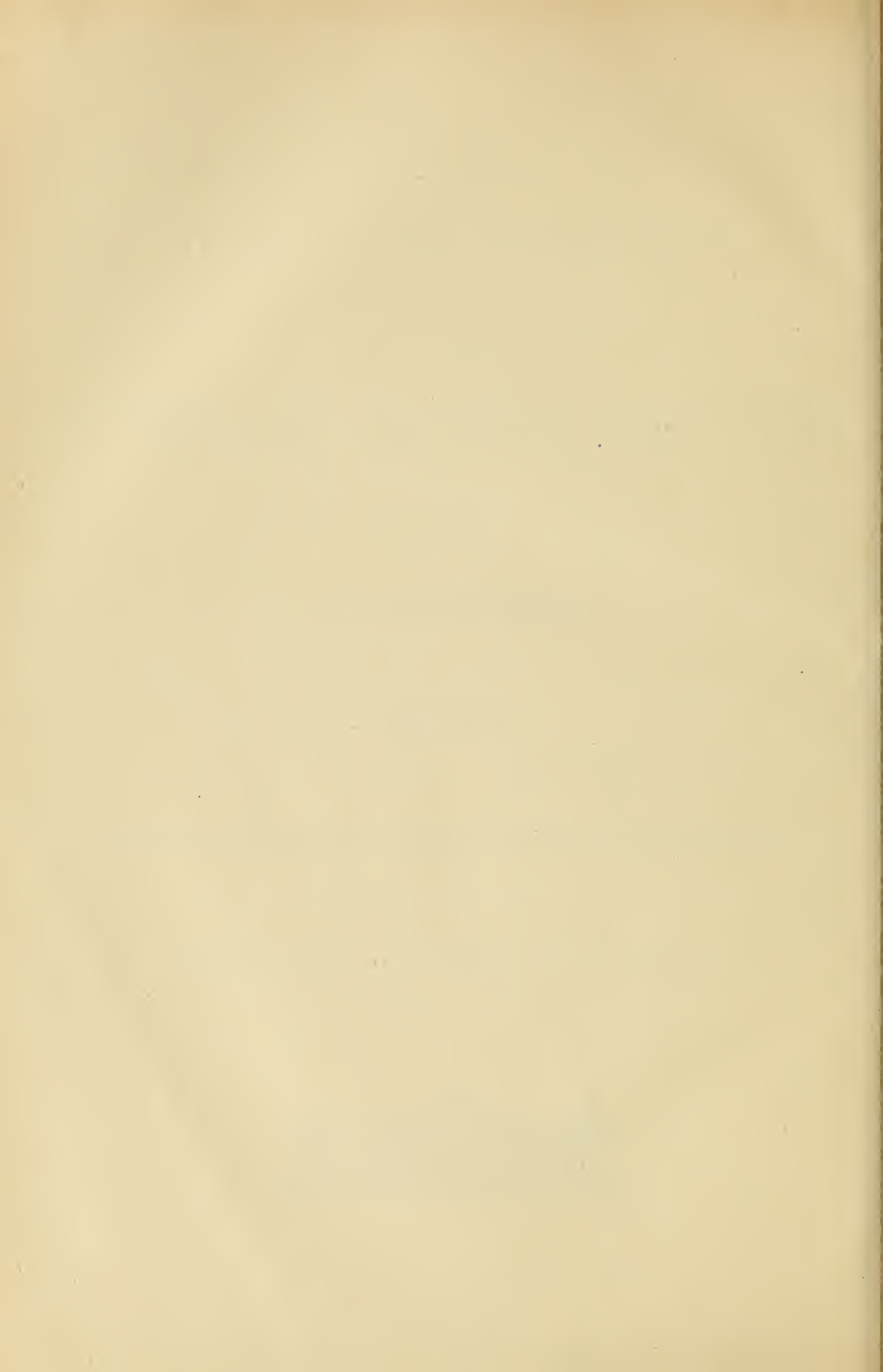
TWENTY-SIXTH ANNUAL REPORT
OF THE
ENTOMOLOGICAL SOCIETY
OF
ONTARIO
1895.

PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY



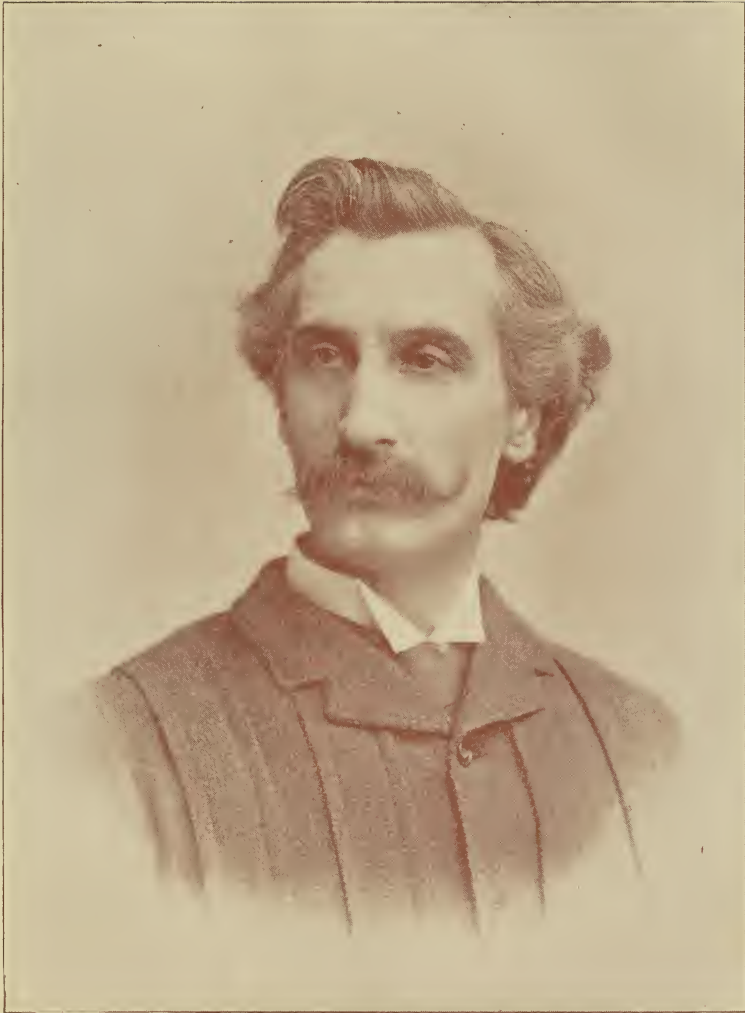
TORONTO:
WARWICK BROS. & RUTTER, PRINTERS, &C., 68 AND 70, FRONT STREET WEST.
1896.



CONTENTS.

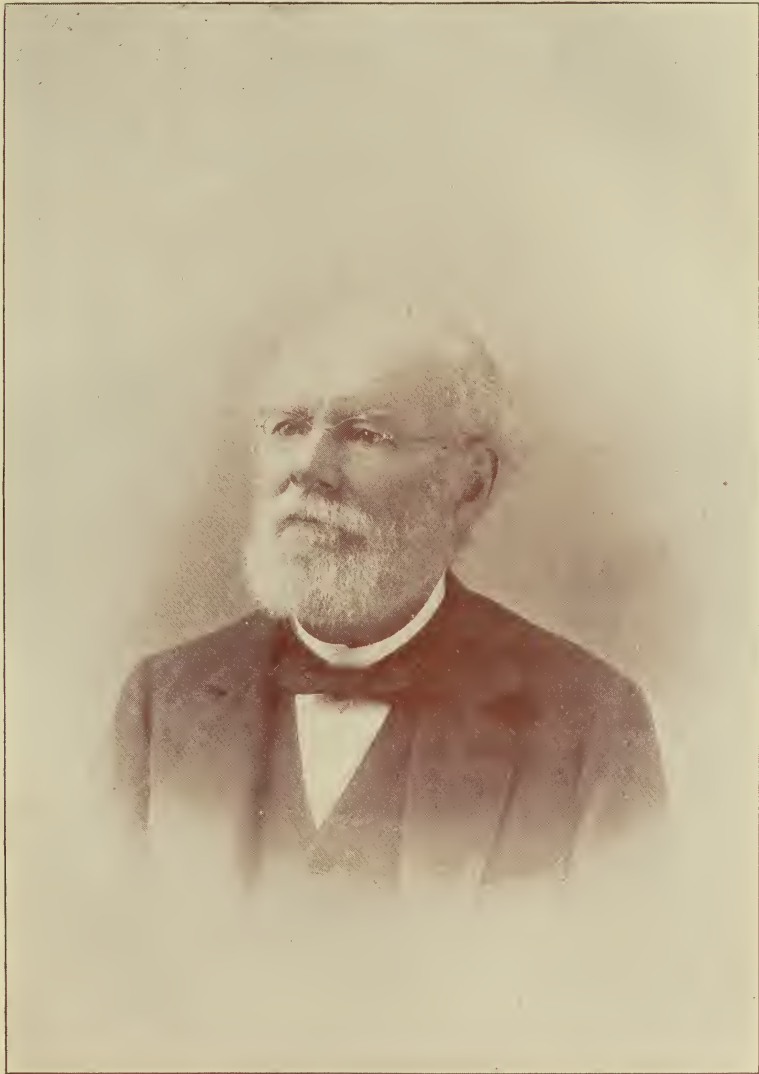
	PAGE.
LETTER OF TRANSMISSION	1
LIST OF OFFICERS FOR 1896.....	2
ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY.....	3
Report of the Librarian and Curator: J. A. MOFFAT.....	3
Report of the Treasurer: J. A. BALKWILL	4
Report of the Council.....	4
Report of the Montreal Branch: LACHLAN GIBB	6
The New Agriculture: C. C. JAMES.....	7
The Value of Entomology: JAMES FLETCHER	16
How the Forest in Bedford was Swept Away: Rev. T. W. FYLES.....	21
Report of the Botanical Section: W. T. McCLEMENT.....	26
Report of the Geological Section: S. WOOLVERTON.....	26
Report of the Microscopical Section: J. H. BOWMAN	27
Report from the Entomological Society to the Royal Society of Canada: Rev. T. W. FYLES.....	28
Election of Officers	30
Insect Injuries of the Year 1895: JAMES FLETCHER.....	31
The Growth of the Wings of a Luna Moth: J. A. MOFFAT	36
Observations on the Season of 1895: J. A. MOFFAT	38
Variation, with special reference to Insects: J. A. MOFFAT.....	41
Some Winter Insects from Swamp Moss: W. H. HARRINGTON.....	47
Birds as Protectors of Orchards: E. H. FORBUSH	53
The Rocky Mountain Locust and its Allies in Canada: S. H. SCUDDER.....	62
SEVENTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS	67
Entomological Notes and Problems: J. B. SMITH	67
Spraying	70
"Raupenleim" and "Dendrolene": J. B. SMITH	72
Herbivorous Habits of Certain Dermestidæ: F. H. CHITTENDEN	76
The Gypsy Moth.....	78
On the Study of Forest Tree Insects: F. H. HOPKINS.....	80
The Importation and Repression of Destructive Insects: F. M. WEBSTER.....	83
William H. Edwards.....	87
Book Notices.....	88
Obituary of Charles V. Riley: A. S. PACKARD	95
Index	101





PROF. C. V. RILEY, M.A., Ph. D.





WILLIAM H. EDWARDS,
HONORARY MEMBER OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, ETC.



TWENTY-SIXTH ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY OF ONTARIO,

1895.

To the Honorable the Minister of Agriculture :

SIR,—In accordance with the provisions of our Act of Incorporation, I beg to submit herewith the Twenty-Sixth Annual Report of the Entomological Society of Ontario.

The report contains an account of the proceedings at our annual meeting, which was held in the city of London on the 27th and 28th of November last, for the election of officers and the transaction of the general business of the Society. A full report is given of the addresses delivered and papers read during the sessions, as well as the financial statement of the Treasurer and the reports of the sections and other departments of the Society.

The Canadian Entomologist, the monthly magazine issued by the Society, has been regularly published and has now completed its twenty-seventh volume, which in value and interest fully maintains the high reputation which it has so long held.

I have the honor to be, Sir,

Your obedient servant,

W. E. SAUNDERS,

Secretary.

OFFICERS FOR 1896.

<i>President</i>	J. W. DEARNESS	London.
<i>Vice-President</i>	H. H. LYMAN	Montreal.
<i>Secretary</i>	W. E. SAUNDERS.....	do
<i>Treasurer</i>	J. A. BALKWILL	do
 <i>Directors :</i>		
Division No. 1.....	JAMES FLETCHER	Ottawa.
“ 2	REV. C. J. S. BETHUNE.....	Port Hope.
“ 3	GAMBLE GEDDES	Toronto.
“ 4	A. H. KILMAN	Ridgeway.
“ 5	R. W. RENNIE.....	London.
<i>Librarian and Curator</i>	J. A. MOFFAT	do
 <i>Auditors</i>	J. H. BOWMAN.....	do
	J. M. DENTON.....	do
 <i>Editor of the “Canadian Entomologist”</i>	REV. C. J. S. BETHUNE.....	Port Hope.
 <i>Editing Committee</i>	J. FLETCHER.....	Ottawa.
	H. H. LYMAN	Montreal.
	REV. T. W. FYLES	S. Quebec.
	J. M. DENTON	London.
 <i>Delegate to the Royal Society</i>	J. D. EVANS.....	Trenton.
 <i>Committee on Field Days</i>	DR. WOOLVERTON, MESSRS. SHERWOOD, McCLEMENT, BALKWILL, SAUNDERS, ANDERSON, RENNIE, BOWMAN, ELLIOTT, AND STEVENSON.....	London.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY

1895

The thirty-third annual meeting of the Entomological Society of Ontario was held in its rooms in Victoria Hall, London, on Wednesday and Thursday, November 27th and 28th, 1895. In the absence of the President, the chair was taken by the Vice-President, Mr. J. W. Dearness, of London.

The meeting was called to order at four o'clock p.m., on Wednesday, the following members being present: Rev. C. J. S. Bethune, Port Hope; Mr. J. D. Evans, Trenton; Mr. James Fletcher, Ottawa; Mr. H. H. Lyman, Montreal; Rev. T. W. Fyles, South Quebec; Messrs. J. A. Balkwill, J. M. Denton, E. R. Cameron, J. A. Moffat, W. E. Saunders, R. W. Rennie, W. T. McClement and others, of London. A letter of apology was read from Mr. W. H. Harrington, of Ottawa, President of the Society, and a telegram from Capt. Gamble Geddes, of Toronto, regretting their inability to attend the meeting.

Mr. J. A. Moffat, the Librarian and Curator, presented and read his annual report, as follows:

REPORT OF THE LIBRARIAN AND CURATOR

FOR THE YEAR ENDING 31ST OF AUGUST, 1895.

The number of volumes added to the library by gift and purchase during the year was twenty-two. Ten volumes were sent to the binder, but some delay occurred in their return, which prevented their being entered within the year. I considered it desirable to include them in this statement, and in doing so, I had to include several others previously entered, which bring the number added to date up to thirty-eight.

The whole number on the register is 1,399.

The number of volumes issued to local members was thirty-three.

Mr. Fletcher has generously contributed to the library six volumes of the proceedings of the American Association for the Advancement of Science.

Many interesting additions have been made to the Society's collection of native lepidoptera during the year; principally by Mr. C. G. Anderson, one of our local members.

The specimens of *Nemeophila petrosa* received from Mr. Bean of Laggan, have been given a drawer to themselves, arranged in order as upon the plate, with the original numbers attached. The portions of Mr. Bean's paper descriptive of the individual specimens have been placed with them.

Mr. Rennie obtained by exchange cocoons of *Platysamia ceonothi*, and *Antheraea mylitta*, "the India Tussah silk moth," which he kindly shared with the Society. These matured and gave forth their imagoes, which have been placed with the exotic collection.

Respectfully submitted,

J. ALSTON MOFFAT,

Librarian and Curator.

The Treasurer, Mr. J. A. Balkwill, presented the annual statement of the finances of the Society, as follows :

REPORT OF THE TREASURER.

RECEIPTS.	EXPENDITURE.
Balance on hand Sept. 1st, 1894..... \$ 360 60	Printing..... \$ 644 33
Members' fees .. 309 39	Report and meeting expenses .. 216 00
Sales of Entomologist .. 88 56	Library .. 47 38
“ pins, cork, etc .. 66 61	Expense, postage, etc .. 117 02
Government grant .. 1,000 00	Rent and fuel .. 102 70
Advertisements .. 21 40	Insurance .. 28 00
Interest .. 9 47	Salaries .. 300 00
	Pins, cork, etc..... 58 69
	Balance on hand, August 31st, 1895.... 341 91
\$1,856 03	\$1,856 03

We hereby certify that we have examined the books of the Treasurer and compared them with the vouchers, and find them correct and that the above is a correct statement.

JOHN M. DENTON, }
JAS. H. BOWMAN, } Auditors.

The Treasurer explained the various items of receipts and expenditure and stated that it would require the closest economy to carry on the work of the Society during the remainder of the year. Dr. Bethune and Mr. Fletcher spoke in commendation of the valuable services of Mr. Balkwill and of the high appreciation in which they were held by the members of the Society.

Mr. W. E. Saunders gave an account of the proceedings of the local members of the council with regard to obtaining more suitable and commodious rooms for the Society. After a long discussion, which was participated in by most of the members present, it was resolved that the matter be left in the hands of the local members of the council, who were authorized to take whatever action seemed to them most desirable for the welfare of the Society.

An application from the Senate of the Western University of Ontario was read requesting that their students in geology should be permitted to attend, free of charge, the meetings of the geological section of the Society. After some consideration it was resolved that the matter should be left in the hands of Dr. Woolverton, who is to deliver the lectures, and that he should have the liberty, which is shared by all the members, of introducing friends to the meetings of the section.

The following report of the council was next read and adopted :

REPORT OF THE COUNCIL.

The council of the Entomological Society of Ontario have much pleasure in presenting the following report of their proceedings during the past year :

They have much satisfaction in stating that the membership of the Society in London, and in the Province of Ontario generally, has largely increased, and that additions have also been made to our numbers in other parts of the Dominion, especially in British Columbia. The list of subscribers in the United States and Europe has continued about the same. The total number of names on our books is now considerably larger than ever before since the formation of the Society, while the interest in its work has by no means diminished.

The twenty-fifth annual report on Economic and general Entomology was presented to the Minister of Agriculture for Ontario in November last, and was printed and distributed at the beginning of January. It contained one hundred and twenty-six pages, a larger number than hitherto, and was illustrated with no less than sixty wood cuts, and two full page portraits, one of Prof. William Saunders, one of the founders and for many years President of the Society and editor of *The Canadian Entomologist*, and the other of Mr. A. R. Grote, of Hildesheim, Germany, one of our honorary members and a constant contributor to our publications. In addition to an account of the proceedings at the annual meeting, the volume contains the annual address of Mr. Harrington, the President, and the following interesting and important papers: "Insects collected in Bermuda," by Capt. Geddes; "Common names for Butterflies—Shall we have them?" by Mr. Lyman; "The Butterflies of the Eastern Provinces of Canada," by Dr. Bethune; "The Pitcher-plant Moth," "The Gypsy Moth," "The San Jose Scale," and "Injurious Insects of the year 1894," by Mr. Fletcher; "Foods, Feeders and Fed," by Mr. Fyles; "The economic value of Parasitism," by Mr. F. M. Webster; "The structure of the undeveloped wings of the Saturniadae" and "A reappearance of *Pieris protodice*," by Mr. Moffat; also a report of the sixth annual meeting of the Association of Economic Entomologists together with a few of the most interesting papers.

The Canadian Entomologist, the monthly magazine published by the Society, completed its twenty-sixth volume in December last. The numbers of the twenty-seventh volume have been regularly issued at the beginning of each month during the current year; the closing number for December is now in type and will be distributed next week. The volume when completed will consist of about 360 pages, and is illustrated by no less than six full page plates and twenty-three wood cuts. Among the contributors to its pages are most of the leading Entomologists in North America as well as several in Europe. It is now the oldest monthly publication on insects published in America, and continues to maintain the high reputation that it has so long enjoyed.

A noteworthy event in the history of the Society is the republication, through the kindness of the Minister of Agriculture for Ontario, of the first annual report of our Society, which was prepared by Messrs. Bethune, Saunders and Reed in the year 1870, and published early in 1871. It contains articles on the insects injurious to the apple, grape and plum, and has been for some time out of print. Notwithstanding that almost a quarter of a century has gone by since it was first issued, the volume is still in demand for public libraries and private collections.

The cabinets of the Society have been carefully looked after by the Curator, Mr. J. Alston Moffat, during the past year, and many valuable additions have been made. The collections owe many of these additions to the zealous work of Mr. O. G. Anderson, who has devoted much time and energy to the lepidoptera in the neighborhood of London. Mr. Bean, of Laggan, has presented a set of the specimens of *Nemeophila petrosa* which were illustrated in the April number of *The Canadian Entomologist*. Mr. Rennie has presented specimens of some interesting silk moths, of which he had obtained the cocoons; and Mr. Rowland Hill a beautiful case of Australian insects.

Mr. E. Firmstone Heath, of Cartwright, Manitoba, has sent through Mr. Fletcher, some interesting and rare lepidoptera captured in his own neighborhood; and Mr. Green, of Osoyoos, British Columbia, has also sent some very valuable and typical representative specimens of butterflies from the Okanagan valley.

The library is steadily growing and now numbers 1,400 volumes, many of them being rare and extremely valuable works.

The report of the Treasurer shows that our finances are in a satisfactory condition. The balance on hand at the close of the financial year is about the same as in his statement at our last annual meeting, and will all be absorbed by the expenses attending the remaining portion of the year. The question of rooms for the Society will have to be dealt with very soon, as the present quarters are too small for the library and collections and the meetings of the sections. It is to be hoped that the new council will be able to settle the matter to the general satisfaction.

The reports of the geological, microscopical and botanical sections are presented herewith. They have held regular meetings during the past season and have accomplished much satisfactory work. The ornithological section has become so much reduced in numbers that no meetings have been held, but it is confidently expected that there will be a revival of interest next year.

The Society was represented by the Rev. T. W. Fyles at the annual meeting of the Royal Society of Canada held in Ottawa in May last. His report is also presented herewith.

All of which is respectfully submitted,

W. E. SAUNDERS,
Secretary.

Mr. Lyman read the report of the Montreal branch as follows :

REPORT OF THE MONTREAL BRANCH.

Annual meeting of the Montreal branch of the Entomological Society of Ontario.

The twenty-second annual meeting of the Montreal branch was held in the library of the Natural History Society, on Tuesday evening, 14th May, at 8.15 o'clock.

Members present : Messrs. H. H. Lyman, President ; Lachlan Gibb, Vice-President ; Geo. Kearley, and A. F. Winn, Acting Secretary.

The President presented the following report of the Council :

REPORT OF COUNCIL.

In presenting their twenty-second annual report the council have much pleasure in congratulating the branch upon having unquestionably come of age,* and feel that so long a period of continued and unbroken existence is worthy of remark in view of the very small numbers interested in this pursuit.

During the year seven meetings were held and the following papers and communications were read :

An hour at Hochelaga, A. F. Winn.

Notes on the season of 1894, H. H. Lyman.

Note on the occurrence of *Pamphila Manitoba* at St. Hubert P. Q., A. F. Winn.

Mantis and Mantispa, H. H. LYMAN.

How the forest of the district of Bedford was swept away, Rev. T. W. Fyles.

Note on the occurrence of *Chionobas Tarpeia* in North America, H. H. Lyman.

Four new members have been added to the branch's roll and it is to be hoped that increased energy will be shown in the study of the many inviting subjects which this department of science holds out to those students who are really in earnest in the pursuit of knowledge.

The Treasurer's report shows that the finances of the branch are in a healthy condition.

Respectfully submitted on behalf of the council.

H. H. LYMAN,
President.

*It was organized 16th October, 1873.

It was moved and carried that the reports of the council and Secretary-Treasurer be received and adopted.

The following officers were elected for the ensuing year :

President—H. H. Lyman.

Vice-President—A. F. Winn.

Secretary-Treasurer—Lachlan Gibb.

Council—G. Kearley, W. C. Adams.

The meeting then adjourned.

LACHLAN GIBB,
Secretary.

Regret was expressed that no member had been able to represent the Society at the annual meeting of the Association of Economic Entomologists held at Springfield, Mass., in August last. Through the kindness of Mr. L. O. Howard a full account of the proceedings has been received, and an abstract will be found in subsequent pages of this report.

Mr. Lyman exhibited a handsome quarto volume containing beautifully colored plates of the butterflies of Germany, which only cost, when delivered here, \$4.59. It is entitled "Die Schmetterlinge Mittel-Europas," by Mar Korb, and is published at Nuremburg, Germany.

A paper was next read by Mr. Lyman on *Colias Interior*, the consideration of which was deferred to the following day.

The hour of 6 o'clock having arrived the meeting adjourned.

EVENING SESSION.

In the evening the Society held a public meeting in the City Hall, which was attended by between fifty and sixty persons, for the most part members of the Society. The chair was taken at 8 o'clock by his Worship, Mayor Little; on the platform were Professor C. C. James, Deputy Minister of Agriculture for Ontario, Rev. Dr. Bethune, Rev. T. W. Fyles, Mr. Dearness, Mr. W. E. Saunders and Dr. Roome, M.P. The Mayor opened the proceedings with the following remarks :

LADIES AND GENTLEMEN,—Our city has had the good fortune in recent years to be many times selected as the meeting place of conventions of fraternal and other societies and we are always glad to welcome them in our midst. To-night we have amongst us the representatives of a society, which, though provincial or Dominion in its character, has its headquarters in our own city and is therefore all the more welcome on that account. I am sure, although there are not a very large number present to-night, you will make up by your enthusiasm for whatever you may want in numbers. This Society has been quietly doing a very valuable work in our country. I understand that the journal which they publish is considered the most valuable work on entomology that is published on the continent of America and it is also the oldest. It is all the more interesting to us, because the Society was founded largely through the efforts of Mr. Bethune, who is on the platform to-night, and one of our own fellow citizens, Prof. Saunders, whom though at Ottawa, we still look upon as a citizen and we are proud of him and his work. I therefore say this Society has a warm place in our hearts, because of its origin, and because it has remained among us. I am sure those who have come out to-night will not regret it.

Without any further remark I will call upon Prof. James of the Department of Agriculture, Toronto, to address the meeting. (Applause)

THE NEW AGRICULTURE.

BY MR. C. C. JAMES, DEPUTY MINISTER OF AGRICULTURE.

Mr. Chairman, Ladies and Gentlemen, and members of the Entomological Society, I believe it is somewhat of an innovation for the Ontario Entomological Society to hold an open meeting, or as we sometimes say a popular meeting, in connection with its deliberations. This, I take it, will have the effect of bringing the Society more into sympathy with the people, or rather of bringing the people more into sympathy with the workings of the Society. As a rule we find that the best men do their work most quietly. The men in this world who do the most advertising of themselves, who create the greatest stir for the time being, are not always the most important men in the world. So with regard to many of these societies, those who are doing their work the most quietly are very frequently the ones that are doing the most important work for the community. And the very fact that this Society for twenty-five years has been carrying on its work by

itself, quietly, without creating very much stir, is not a condemnation of the Society, but, to my mind, the very fact that it is able to live after years of this quiet life shows it has that true vitality which will enable it to exist and to do good work in this world. (Applause)

We are not very many who are gathered here to-night, and what we have to say will be more in the line of a quiet talk between ourselves, more or less of a conversation one with another, with regard to the work in which we are interested. I propose to talk in regard to general agriculture and in connection with my remarks I may have something to say in regard to entomology and its relationship to agriculture. I do not consider that there is any more important question to be discussed or studied by city people, as most of you no doubt are, than this subject of agriculture. Some one may say that agriculture ought to be reserved for farmers and farmers' sons and families, and that the bringing in of the subject of agriculture at a town or city meeting is a great mistake. But there are two or three reasons that we can offer in connection with this, that are quite sufficient to warrant us in introducing a subject of this kind. In the first place we all admit that this country is first and foremost an agricultural country, that the progress of this country depends more upon agriculture than upon any other industry and that just as agriculture rises or falls so will the general prosperity of this country rise or fall with it. When the farmer is prosperous, has good crops and good prices, the people in the towns and cities feel the effect; and depression in the country is felt very soon in the city. Then again there is an old idea, now being rapidly removed, that agriculture after all is not a very interesting subject. The principal reason of talking to-night is to endeavor to show to you, in an indirect manner it may be, that after all there is a great deal of interest in agriculture for the people of our towns and cities.

There has been more or less talk of teaching agriculture in the schools and some have said it should be taught in the rural schools, but there are many people in this country who have looked into this question and who after thinking over it carefully have come to the conclusion, that agriculture should be taught in our city schools as well as in the country; that there is as much need for the education of our city pupils as for the rural in the subject of agriculture. Perhaps I may be able to show you, in a few cases at least, that agriculture is not that dry hum-drum business that many of us have sometimes thought it to be, but that connected with it are some of the most important and interesting questions that have presented themselves to the mass of human beings. We have heard a great deal of late in regard to many of the new questions, the *new woman* for instance has filled column after column of our city papers. Now it struck me in looking around for a subject that possibly I could not take anything better than this "*the new agriculture.*" (Applause.)

What are the changes that have taken place, or what are the forces that are present that have given us and are giving a new agriculture?

The first is the great increase of transportation facilities. Those of you who are older than the speaker here to-night will remember the time when transportation between the old countries of the world and this country was very slow. To-day we have the great continents connected by lines of steamers that run as rapidly as some of the accommodation trains upon our railroads. Nearly every continent in the world is belted by one or more great trans-continental railways. Even Russia is about completing a great trans-Siberian railway, Africa will be the next country to have a trans-continental railway. The result is that the world, so to speak, has been shrunken up and although we have these continents at distances of five to eight thousand miles apart and although we have great stretches of country such as this North America of ours, still with the improved steamship lines and railways, these countries have been so closely brought together that practically this world is now simply one great continent or one great country. What has been the effect of that? The effect has been that the great consuming markets have been brought closer to their sources of supply and it is not very much of an advantage now to be stationed a thousand, or two, or three, or four thousand miles nearer to the great consuming centres of the world, than some other countries. For instance Canada, because she is only some four thousand miles from England has not a very great advantage over Australia which

is, I think, some twelve thousand miles away. South America is practically as close to Europe to-day as we are. Africa, both in the north and south is about as close to Europe as we are. There is very little difference in the cost of transportation over these great ocean distances and the result of it has been, that these countries with great territories of fertile lands, and with cheap labor, have been able to produce with almost equal facilities the enormous quantities of crude materials, such as wheat and oats and barley, and as a consequence the great consuming countries of the world are supplied as they have never been before. And the prices of these products have been going down lower and lower until we find that one great result has been that these crude products of the farm have been brought to the great commercial centres at very low rates. Let me give you a couple of instances. It costs about thirty-four cents to pay all charges for sending a bushel of wheat from Manitoba to Liverpool, let us say half a cent on a pound. From Australia butter has been shipped to London at a rate less than two cents a pound. The transportation charges have been brought so low that it is possible to ship butter in refrigerator steamships from the dock in Australia to the dock at London for a smaller amount than it can be sent by rail from the north of England to the south. So that you see the great increase in transportation facilities has reduced distances; has brought the great producing nations of the world closer to one another, and they can now barter in the markets at about equal advantage one with the other. The result of this has been that the products that are of easy production have suffered in price as a consequence, and only those products which are more difficult to produce, which are produced by the more highly cultivated people, by a people with better facilities, with better training and better education, have been able to hold their own. Our farmers to-day are turning their attention more and more to the production of these higher classed articles, these articles which require more skill, because thereby they come less and less into competition with cheap labor and cheap soil. The production of these lower grades brings their higher priced labor in competition with lower priced, whereas the production of the higher classes, such as the best class of fruit and dairying production brings them into competition, not with cheap labor and cheap lands, but with the better class of labor and lands of Europe.

The second cause is the application of machinery. This perhaps might not at first sight present itself quite as forcibly to your minds as it will if I give an instance or two. The grains as we grow them, such as wheat and barley, have been raised from time immemorial. It is impossible to say when wheat and barley and grains of all kinds were first produced upon the earth. Go back as far as you will, you will find in history and in archæological remains the traces of the instruments for cutting have been shaped something like the curved arm, the sickle, and yet if you think, it was only the other day the sickle went out of use among civilized people. From the time that wheat and barley and oats were first produced until within a few years ago, the sickle, with practically little or no change, remained the sole reaping instrument of the human race. About 1826 a Scotch minister presented for examination to the Highland and Agricultural Society of Scotland a new machine, the forerunner of what we now know as the reaping machine. About the year 1831 Cyrus MacCormack brought out the first reaping machine in the United States. It was not until the year '41 or '42 after ten long years of experiment and changing and testing that this machine was finally put upon the market. It is only within the last fifty years that the sickle, the scythe and the cradle after being used for so many centuries have been superseded by the reaping machine. All at once what wonderful developments began. The reaper and the mower, and then a very few years ago came the self-binder, and we have to-day in California the harvester and header machine, drawn by from eighteen to twenty-four horses or mules, which reaps and threshes the grain and leaves it in bags on the field. The question we ask ourselves right here is, "What next?" One hesitates to say or give an answer to that question when we see what has happened, what wonderful steps in progress have been made from the simple sickle or scythe to the self-binder. When within the period of thirty or forty years such wonderful evolution has taken place after a long period of quiescence, one may say, what will be introduced next?

Take another instance. In connection with dairying the method in olden times of churning the milk was by a very simple operation, either by means of a bag hung up and

pounded or swung around, or else in a vessel quite similar to our old-fashioned barrel churn. It is not very many years since the old-fashioned dash churn and implements of this kind were used for the manufacture both of butter and cheese. Then someone introduced the application of power, such as horse power, steam power, the introduction of the box churn and one after another applications of the various kinds of machinery began to be made, till now what have we to-day? We have a machine that can be set up in the barn to milk the cows. Although this machine is in an undeveloped condition, nevertheless it does its work and proves we are on the right track. That milk drawn by a machine can now be put into another machine and by means of it the skim-milk comes out of one spout and the cream out of another. This cream can be put into another vessel or machine, and by proper temperature and the addition of a substance somewhat resembling yeast, a fermentation can be started, and just that kind of fermentation that we desire in connection with it. After the fermentation has gone on a certain time this can be put into another machine and churned, and after churning it can be worked and packed by machinery. So that now it is possible, although not altogether practical, from the very milking to the putting of the finished article on the market, to do the whole of the work by machinery. This wonderful progress has taken place within the last quarter of a century.

As we look at farming in its different aspects, machinery has been applied at this point and that point, and agriculture is being put on an equality with the manufacturing establishments of our towns and cities. You ask yourselves this question, "Why have our great manufactures in the towns and cities developed?" The principal reason for this is in the application of machinery to the work. Why is it that machinery has been developed in connection with all these other industries and yet it has taken so long to bring the attention of inventors to the work of agriculture? Well, one reason is that there has been no great necessity for it until recent years. We sometimes hear it said that the men are leaving the farms because they are not required, because so much machinery has been brought in that a man with a machine can now do as much work as a man and two hired men could do before. There is another side to that question, viz., because of this drawing away of so many farmers' sons from the farms to the towns and cities, because of the want, therefore the supply of machinery has been produced. Both of these things no doubt have been effective. That is, machinery has been produced because it has been required; and people have left the country since they were not required because of the presence of machinery. According to the census of 1891 there were farmers and farmers' sons in Canada to the number of 649,506, in 1881 there 656,712. From '81 to '91 the number of farmers and farmers' sons in Canada decreased by over 7,000, yet during that period we had the opening up of Manitoba and also of the North-West, and the agricultural product of Canada is greater to-day than it ever was before. If you put these two or three facts together you can easily see the great part machinery has been playing in connection with agriculture in Canada for the last ten years. Although the number of farmers decreased to the extent of 7,000, nevertheless the total output of agriculture has vastly increased. This is owing to a great extent to the application of improved machinery in connection with agriculture.

The next point in connection with agriculture that I wish to refer to is one that comes as a sort of rider to the last; a companion to it, namely, the application of science to agriculture. Now, in certain quarters the moment you begin to talk about the science of agriculture and scientific farming an objection is raised and people say there is nothing scientific about it, it is all practice, and when you find a scientific farmer you find a farmer who does not make much progress.

I desire to give a few facts to show that science has been applied quite successfully to the improvement of agriculture in this country, and further, that just as we bring to bear upon agriculture the latest and best developments of the different sciences, so we may expect agriculture to make improvement. One of the great reasons why agriculture remained on a dead level for so many centuries was simply because the attention of scientific men had not been directed to agriculture as a field for investigation. Scientists had been expending their time and energy with the work that is carried on in

towns and cities. To-day we find as much attention being paid to the science of the calling of agriculture as to anything else, and the result has been wonderful progress, a wonderful development, which has begun of late and which is now in progress, and the result of which we can hardly forecast at the present time.

Let us take two or three illustrations: We sometimes hear it said that there is not very much in agriculture, that it is a dry subject, with nothing interesting in it, that it belongs so to speak to the common people and not to the literary class; there is nothing about it likely to attract the attention of people. Now, I will give you an illustration, which probably you may have had presented to you before. It has been known for years that there is wonderful difference in different crops, in the methods of their feeding. For instance, they say clover will feed in one way, that wheat will feed in another, that our common grasses of the field feed in another, and because of their different methods of feeding, therefore, it is advisable that we rotate crops, one kind one year, another kind another year. We can perhaps illustrate that by representing before us here a large table. Suppose a long table were set up in this room, filled with all manner of food, and you as an audience were asked to sit down at the table to partake or taste, and to take all you would want to eat. No two of you would want to eat the same kind of food. One man would have a preference for fruits; another man might have a great preference for meats; in fact there would be a choice in the kinds of meat. Your tastes differ; your methods of feeding differ. After you were through, if you will allow the comparison to be taken to a little lower level, suppose we were to bring in some animals of another kind whose tastes were different from ours, they would be able to take from what was left. Still there would be a portion of the food they would not take, and we could bring in something else and finally the scraps might be thrown out to the poultry. So if you alone were to be fed upon that food there would be a considerable amount that would not be taken; you could not make use of it, but what you did not want some other animal would devour; what the second class of animal would not devour the third would. Here is a large feast, so to speak, prepared by nature for plants, and we put one kind of plant upon that soil this year. It has a preference for a certain class of food and takes it, and next year another kind of plant is put upon that field which has a different feeling capacity from the one of the preceding year and that plant takes what the other one does not want, and so on by rotating year after year, for three or four or five years, we are able to satisfy the wants of all, whereas if we kept on with the one plant year after year, we would have exhausted the particular food of that one plant and the rest of the food that was there would have been left lying idle all the time. Many farmers in years past, thinking the soils of this country were entirely inexhaustible, put in wheat this year and wheat next year and so on, until finally they were forced to the conclusion that there was nothing left for the wheat and they have taken their attention to other things. We find in many cases what was once a first-class wheat farm became a very poor wheat farm, and then after a number of years that poor wheat farm has become a first-class dairy farm, because different crops have been grown for milk, butter, and cheese.

I want to refer more particularly to one of these plants, viz.: Clover. I do not think there is any plant that presents a more interesting study, interesting though they all may be, than this much neglected and underrated clover plant. It was found that it fed in a different way entirely from the wheat, and then the question that presents itself to the minds of some of these much despised scientists is, in what way does that clover plant live? How does it differ in its feeding from other plants? After a long and careful examination, some came to the conclusion that it got most of its nourishments out of the air. Others concluded because it had a long root and it could go down into the sub-soil, that it got its nourishment there. They finally found something that had escaped the attention of most examiners, in connection with the roots of the clover plant upon which there were little knots or nodules. Now, I suppose hundreds of thousands of clover plants had been examined and these little knots had been seen. Someone who was a little more inquisitive pushed his question a little further and began to ask himself this question seriously: "Now this little bud or nodule on the roots must after all play some part in the economy of this clover plant." And to sum the whole thing this has been the

result of investigation ; that these little knots are filled with very minute organisms very difficult to describe, very minute specks somewhat similar to the very minute specks we find in yeast. These are living in the roots like little parasites and the effect of their living there is to take up nitrogen from the air and in some way to give it to the plant for its subsistence, so that whenever one of these nodules comes on the clover root we find it has the means of taking up food out of the air, and then when we turn over the plant and allow it to decay in the soil, we put in the soil a certain amount of food that this plant has taken up out of the air ; and the result of it is there is an excess of food there for the next plant that comes along. Now the wheat does not possess that little nodule and it does not take up the nitrogen out of the air, and the result has been that, that little investigation,—little we may call it, yet momentous in its results—has established the practice of preceding the wheat crop by a crop such as clover, or peas or beans.

Let me give you one instance in connection with entomology which has seemed to me since I read it some years ago, almost like a fairy tale. I will give it to you just as it stands. About eight or nine years ago the complete destruction of the orange groves of California was threatened by the spread of an insect known as the cottony-cushion scale. This insect was covering the limbs of the trees and the result was the vitality was being sucked right out of these trees by millions of tiny insects. The pest got completely beyond the control of the fruit growers of that country and in their despair they appealed for help to somebody or anybody. Professor Riley who was in charge of the Entomological Department at Washington, and who unfortunately met his death this year,—one of the greatest benefactors the American people has ever known—at once began the investigation of that question. Being an expert entomologist he knew practically every country in the world where that scale insect was common and he knew that the most likely place from which it had come was Australia. It had probably been introduced some twenty years before that, in bringing in fruit trees or vines from Australia. He however knew it had never become a pest in Australia. Now if it is found in Australia and later found in California and has become a pest in California and has not become a pest in Australia, he concluded that there must be something in Australia that will stop it, so he despatched two assistants to Australia to investigate it and they sent back consignments of lady-bug beetles or lady-bugs as they are commonly known. You have seen these running back and forth over the leaves and branches of the fruit trees doing great destruction to the other insects. Within a very short time, less than a year, although these scale insects had been increasing for twenty years and practically had the products of California by the throat, and in fact had taken possession of the country ; in less than a year, this little lady-bug increased to such quantities that it swept the scale out of existence or got it into such control, that the fruit interests of California were saved. (Applause). I do not suppose that anybody could sit down and figure up the amount of money that was saved or made for the United States by that simple little insect brought in by a man known to very few present. You do not see his name prominent in the newspapers. The fact was not heralded broadcast in great flaming type. He was not given any great ovation. It is a question whether any monument will be erected to him by the United States, yet it is doubtful whether the United States has had any greater benefactor than that man and his associates.

Take the potato bug, what would we do to-day if we did not know that simply by dusting Paris green on potato plants we could effectually head off and kill the potato beetle. We could not raise potatoes at all. Where has that come from? It was not picked up by chance, somebody did not sit down one day and write to the paper that he thought that if you dust the potato bug with Paris green you would stop it. Back of that was careful investigation by these same men who study the habits, mode, and living and all about the potato bug. We might go on and give instance after instance. A great many of the various methods that are being practised to-day, many of the best practices we have in connection with agriculture to-day have come, not by hap hazard or by chance, but have been worked out by men on small salaries, working in obscure places, who have devoted themselves to their work with such energy as we have not had surpassed in any other calling, I care not what one you mention.

What a large portion of our reading is monopolized by a few things. I suppose the people of London know how much importance is attached to politics. It seems to be necessary the world over to have politics, but there are other things that are constantly filling the newspapers. What does that prove? That the people want to hear about these things, that the people have their attention taken up with these things, yet it is not very often that you find the most valuable columns of the newspapers given over to some great agriculture event, unless it may be in the case of agricultural depression or crop failure where there is something that is going to effect the finances of the whole country.

The point I want to make is this, there are lots of things happening in connection with agriculture, that are far more important to the prosperity of the country than these things which seem to occupy such an important place in connection with public attention. I have brought along with me a picture to illustrate that. Last summer, many of our Canadian papers were interested in a discussion, as to whether the American Society of Colonial Wars should be allowed to go down to Louisburg, Cape Breton, and erect a monument to commemorate the taking of that place by the Americans, British Colonists, as they were at that time. If I remember correctly some 150 years ago they occupied the place and held it for a short time, and then the French people took it back again. Now that event has cropped up again, after a period of 150 years. That event has been made so important to a large class of the community that they felt themselves constrained to raise a large fund, to get together a large excursion party, and to journey to Louisburg and erect that monument. It created so much attention at the time that it was a matter of doubt as to whether the Canadian Government ought to allow these people to go over there and erect the monument or not. This picture was sent me by Mr. Thompson, of Massachusetts, and I will just read you the inscription upon it. It is doubtful whether half a dozen in this room have ever seen this in the newspapers, or whether they know such a monument was erected. "This pillar, erected in 1895 by the Rumford Historical Association, incorporated April 28th, 1877, marks the estate where in 1793 Samuel Thompson, Esq., while locating the line of the Middlesex Canal discovered the first Pecker Apple Tree, later named the Baldwin." Now, I will submit it to you as to whether it was of more importance to the country to capture and hold for a short time, that little point down there on Cape Breton, or to discover the "Baldwin Apple." That Baldwin apple was discovered in 1793, and at the present day if you pick up in the fall of the year, just about this time, the market reports in Liverpool, you will find a few kinds of apples mentioned. Greenings so much a barrel, Spies so much, Baldwins so much. Practically from that day to this the Baldwin apple has been produced over the Eastern and Western States, and in Canada, and has been bringing in year by year a large amount of money to the American people. And yet events of that kind are practically lost sight of; whereas events such as I have spoken of, are blazed forth to the country and the minds of the people are filled with it. Now it seems to me these things are out of all due proportion. Probably we cannot rectify them, yet the point I want to make here is that there are a great many things happening, there are a great many conclusions being arrived at in connection with the prosperity of this country that are entirely overlooked, whereas other events that are of little consequence after all, are magnified and fill column after column of the newspaper. What is the result of this? Suppose you ask the boys and girls in the rural parts, and the boys and girls in our towns and cities, what effect the reading of these matters has upon their minds? Is it not a fact that it suggests to their minds the paramount importance of politics and such things as concern town and city life. The result is their minds become filled with the events of town and city life; their inclinations are drawn off in that direction; the ties which bind them to agriculture become cut one after another, and the ties which lure them away become greater and greater, till we find a great many of these, to their discomfort afterward, are lost to agriculture and a great many men who would have made first-class agriculturalists, are drafted off in other lines of work to take second and third-rate positions.

The last point I desire to touch upon in connection with this new agriculture, is that during the last ten or twelve years, to say nothing about the past twenty-five years,

there has been wonderful development in connection with the facilities for acquiring information in regard to agriculture. These things that I have mentioned I have no doubt will be righted some day, and before long you will find the histories of this country will not be filled merely with accounts of men killing one another, they will not be filled merely with the names of persons who have occupied positions in towns and cities, but you will find there the development of the people traced. A gentleman came to me the other day who had for sale a book, dealing with the history of this country. He said: "You will find there everything in connection with this country." I said: "I will be very glad to get it, I have been looking for a great many things and have not been able to find them." Now, before you go away we will just try it. I said: "When was the first Agricultural Society formed in Ontario?" "I don't know," well, I said, "that is of importance, is it not?" Is there any organization or institution that has done more to build up and develop the country, until probably within the last four or five years, than the Agricultural Society? It is of as much importance to know as when a certain kind of industry was established in some town or city. I have been on the search for it for the last five years, and finally I think I have nailed it down. There is an utter absence of all these facts in regard to the agricultural development of the country. Until we come down to the period of twenty-five or thirty years it has almost all disappeared. They can tell you of the men who have been elected to Parliament from the very first up to now. They can give you the vote that was polled in connection with any election. They can tell you, perhaps, when a certain new kind of machinery was brought into the country. They cannot tell you when the first improvement was made in connection with live stock, when the first thoroughbred live stock came into the country. I say that it is of much importance to know when these agricultural industries began and how they developed, because on these, rather than the others, the prosperity of this country has been built up. My point is, there ought to be a proper balance between these things and our histories should not be filled with other events to the exclusion of those which are equally important.

A wonderful change has taken place in the facilities for carrying on experimental work and getting an agricultural education. Take this province, we have the Agricultural College at Guelph and the Experimental Farm at Ottawa, from which our friend Mr. Fletcher comes. We have a school or college of agriculture at Kingston, and now we have a dairy school in the west at Strathroy, so we have four points in this province from which comes information in regard to some of the later developments in agriculture. Then we have six or eight different points at which experiments in connection with fruit growing will be carried on, and there is a great development along that line. Before long we will have this province dotted over with little stations from which the latest information may be obtained, and each of these will be a centre leavening the whole surrounding country.

Then we have the societies. Beginning with the time of the organization of the Province of Ontario in 1867, we have from then on had the organization of society after society. till now we have three dairy associations, two poultry associations, the fruit growers, the bee-keepers and the sheep-breeders and the swine-breeders, and a great many other stock associations, and last, but not least that association to which we are indebted to-night for this meeting, the Entomological Society which has now been carrying on its work most successfully for the last twenty-five years. I think these societies have all been accomplishing a great deal of good in this country. Some may say they do not get any great benefit, they do not come in immediate contact with the Entomological Society, but each one of these men so to speak becomes a source of information and as they go from these meetings to their homes, to this point and the other, they give out their information. They also come in contact with other men through their writings.

This Society has been quietly doing one of the most important works in connection with agriculture in this province. If these gentlemen were not present I might say something even a little more flattering with regard to them. I have had occasion from year to year of examining the reports of their meetings which they have sent out, because they are published in the department to which I am attached and I can simply say this,

that if the work of all the other societies was as well done as the work of this Society our labors at Toronto would be very much relieved. When the report comes in it is ready at once to go to the printer and we have no further work in connection with it, and year after year when I read that report I have been astonished with the amount of work that has been condensed and packed away. It is not a padded report, it is a report full of information. In looking over the list of persons to whom it is sent I find it has gone to almost every corner of the world. These men have not been content to hide their light under a bushel, but their work has gone out into every province, and has gone out into the whole world. Someone may say, "I do not see any good in finding out what is the peculiarity of certain insects or finding out just how they live." I do not see any good result coming from the work of the bacteriologist who studies with the microscope things small, so that if you were to take up a drop of milk on the point of your penknife and were able to count its inhabitants you would find 1,000,000,000 of these living plants in that drop of milk. The whole system of dairying has been revolutionized by the work of that man who is sometimes called unpractical.

Whenever I hear any of these objections I sometimes think of a saying of Franklin. Franklin you remember in connection with his experiments in electricity sent a kite into the clouds. He told the people that there was electricity up there and they laughed at him. He sent up his kite but the electricity did not come down. However, fortunate for the occasion, we are told, that the kite went up into a black, dark cloud which he positively felt was filled with electricity. Shortly afterwards the rain began to fall. It came down wetting the kite and trickling down the string. Then the hand that held the wet string began to feel the throbbing of the electricity; he proved it to them and they said. "What is the use of it?" And he said. "What is the use of a baby? It will grow to be a man." So in regard to many of these inventions or discoveries or conclusions that the entomologists, and chemists and botanists, and bacteriologists, and biologists and other scientists may find with regard to agriculture. Their discoveries are in the condition of Franklin's baby, and if we will only wait and have faith in the work we are engaged in and give true encouragement and sympathy, some of us at least may live to see these scientific babies grow up to be good, strong, stalwart men in connection with the practice of agriculture in which we are so much interested. (Applause).

At the conclusion of Prof. James's address, which was listened to with great attention and heartily applauded, Dr. Bethune rose and said :

MR. MAYOR, LADIES AND GENTLEMEN,—I propose that we offer our very hearty thanks to Prof. James, for the able and interesting address which he has just given us. Prof. James has come, I am sure, at a great deal of inconvenience to himself on purpose to be present with us here to-night, and to encourage us by the remarks which he has made, and also to give us a great deal of very valuable information. While thanking him for his address to-night I should also like to take the opportunity, as one of the original members of this Society, to express the gratitude that our Society must necessarily feel towards the Department of Agriculture for Ontario, of which Prof. James is Deputy Minister. He has remarked this evening that our Society has been in existence for twenty-five years and the Mayor has also mentioned to-night, that our magazine, *The Canadian Entomologist*, is now the oldest magazine touching on the subject, upon the whole continent of America. But I wish to let you know one reason why our Society and our magazine have survived so many others that have have started in the United States and Canada and that is, that we have been so greatly helped throughout nearly the whole of our existence, by the Department of Agriculture for Ontario. (Applause.) We began in a very small and humble way with a little magazine of eight pages that was to be published whenever we had enough material and enough money, and we had fourteen members, all told, when we began. And we managed like many other societies to struggle on, but unlike most societies of this kind, we have not died a natural death in a few years. The Department of Agriculture came to our assistance, and gave us a small grant at first, which was subsequently greatly increased, so that while a number of years

passed, we have been able to hold our own in the domain of science in North America and to spread our publication, not only all over the continent but, we may safely say, to the ends of the earth. We have correspondents and subscribers in every part of the world, including even South America, Australia, India and Japan, as well as the different countries of Europe. I trust you will unite with me in expressing our thanks to Prof. James. (Applause.)

THE VALUE OF ENTOMOLOGY.

Mr. JAMES FLETCHER, Entomologist of the Experimental Farm at Ottawa, spoke as follows :

Mr. CHAIRMAN, LADIES AND GENTLEMEN,—It is my pleasure and honor on this occasion to represent as well as I can a far better man than myself, namely, the President of our Society. After all the kind words which have fallen from the lips of our esteemed lecturer of the evening, the Deputy Minister of Agriculture, it is difficult to give a resume of the work and objects of the Entomological Society of Ontario without repeating something which may already have been better said. Our Society stands in the position of a Division of Entomology to the Department of Agriculture and Arts, and it is the wish of every member of the council that our work should be of the greatest possible utility to the country at large. The work done in the past has been of an excellent nature, the prosperity and utility of the Society having year by year increased, and I am happy to be able to say that, at the present time, the Society is in a more prosperous condition than it has ever been before. We have a body of active, enthusiastic workers and every equipment for good work—valuable collections of insects, as well as a first-rate botanical collection, a magnificent library, and, in addition, active branches working up not only entomology, but also many other kindred branches of science. The condition of our library is rather remarkable. It is undoubtedly the best library of works on natural history in Canada and one of the best in North America. Now I am quite certain, Mr. Mayor, that the citizens of London are not aware of this fact; they do not know of the valuable collection of books on natural history and the grand museum of insects and plants which are deposited here in their midst, but which specialists are glad to come from all parts of Canada to examine. Some people may say, "What is the use of these collections of insects and plants? They are pretty, it is true, but what is the use of them?" In reply, I would remind such enquirers that these objects are but means to an end. The main object of our Society is to prevent loss to the farmers of Ontario from the attacks of insect pests. The enormous losses which take place in the crops of the province every year from the depredations of injurious insects, can only be controlled by specialists first studying up and understanding the habits of the insects which cause the damage; for this purpose collections of various orders of insects for study and comparison are essentially necessary. Moreover, by collecting and studying all the members of a family, we may frequently anticipate and prevent injury by one species from knowing the habits of an allied member of the same family. We aim then to make our collections as complete as possible and look forward to the time when some day we may have in our cabinets representatives of all the injurious insects which have given trouble in Canada. These are matters of interest to the citizens of London, which place has always been the headquarters of our Society; and my advice to those of you who have not yet found out what treasures you have among you, is to go and find out as soon as possible; it is worth your while, and I can promise you that you will at all times meet with a courteous reception from our Curator, Mr. J. Alston Moffat, who will gladly show the many beautiful objects in his charge to anyone who is interested enough to call upon him.

Some striking instances of the usefulness of the study of entomology have already been well laid before you by Prof. James, and there are numerous others which might be cited. If any proof of the matter were needed, we have merely to think of the large number of official economic entomologists employed by the leading nations of the world,

and to notice how the study of injurious insects is fostered by the most practical people on the globe to-day, the Americans, who indeed were the first to organize a systematic study of practical entomology and fungology. These two branches of knowledge are certainly worthy of much study, for they are the two chief causes of a reduced output, in other words, loss of revenue, in every country of the world.

The losses in the agricultural produce of a country every year due to the ravages of insects are said to be ten per cent. of the whole amount, and there is a further loss of ten per cent. caused by fungi parasitic on plants grown by man as food for himself or his stock. Familiar examples of such parasitic fungi are the black spot of the apple, smut of wheat, oats, barley, etc., grape mildew and potato rot. All of these are diseases which in the past have been the direct cause of the loss of large sums of money, but which now, owing to the studies of specialists, can all be to a large measure controlled by practical methods, cheap, simple and effective, which can be used by every farmer in the country possessed of ordinary intelligence. The same thing is the case with injurious insects. Of those kinds which every year attack our crops and reduce our revenues, by far the larger proportion have been studied out so fully, by men such as those who form the membership of the Entomological Society of Ontario, that at the present time practical remedies are available for all who will take the trouble to ask for them or who have kept themselves posted in the matters which concern vitally the success of their business. But these facts are not appreciated generally by the people most concerned, the agricultural classes. It is an old but true saying:—"We only miss the water when the well runs dry." As a rule, farmers only think of remedies when they find their crops seriously attacked, and they then find that in many cases it is too late to prevent loss. Many of the most successful means of protecting crops are methods of prevention and must be put in practice long before the crop to be protected has reached maturity. The farmers of Canada are much to be envied; for they have advantages not surpassed in any part of the world. Yes, sir; not only have we here the glorious climate and magnificent soil necessary for the production of the best agricultural products; but we have as well wise Governments who are doing everything possible to help us in making our operations successful. We have our most active and useful Department of Agriculture, at Toronto, which publishes every year in its annual report, the latest developments with regard to all subjects brought before the various societies subsidized by the Government; these deal with many different agricultural matters, such as our own Entomological Society of Ontario, the Fruit Growers' Association, the Bee-Keepers' Association, the Sheep and Swine-Breeders' Association, Farmers' Institutes and many others. All of these associations receive grants, and the Government publishes their reports for the good of the farmers of the country. Besides this, we have the Agricultural College at Guelph, a grand institution doing excellent work; and, above all, we have the Dominion Experimental Farm system maintained by the Federal Government, which is constantly at work trying to assist the farmers of Canada by testing and examining all subjects which it is thought may better their position and prospects. The publications of all these institutions are issued free of charge and distributed with a liberal hand. In fact I believe, as I have already said, there is no country in the world where more is being done in a wise way to help farmers than is the case to day in Canada. (Applause.)

Is it not folly then on the part of any man in this country not to apprise himself of these facts and put them in practice? To bring the matter back again abruptly to the work of the Society under whose auspices we are gathered here to-night, is it not folly on the part of any farmer in Canada not to find out what are the latest developments—or, as Prof. James has put it, "what is the new agriculture,"—with regard to the best methods of protecting himself from loss and of saving his crops from the attacks of the hordes of injurious insects which are ready to levy so heavy a tax upon all that he grows?

Many instances might be cited of the good results which have followed the diligent work of entomologists.

Prof. James has already referred to that delightful incident by which the very existence of a lucrative industry, the cultivation of oranges and other citrus fruits in California, was saved from extinction. This was done by the timely introduction from Australia, by the United States Entomologist, Dr. C. V. Riley, of a small parasitic lady-bird beetle *Vedalia cardinalis*, Muls.) which preyed upon the injurious Fluted Scale (*Icerya Purchasi*, Maskell), Fig. 1, an insect which threatened at one time to destroy all the orange groves in the Pacific States. Another instance of good work of particular interest to Ontario farmers, was the practical remedy first hit upon by Mr. L. O. Howard, now U. S. Entomologist, for fighting the Clover-seed Midge. Our farmers in Western Ontario now cut or feed off the first crop of clover about June 20th, to prevent injury to their seed crop by the Clover-seed Midge. This is undoubtedly the best method of preventing loss, but they do not think that the knowledge

of that one fact, which is worth at least half a million dollars a year to Canada, was due to the carefully studied investigations of one man. They know nothing of the arduous and unremitting work which was necessary before

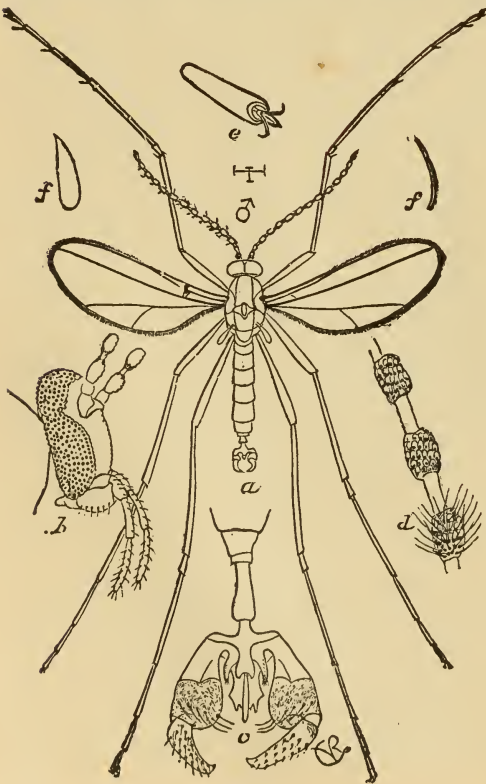


Fig. 2.

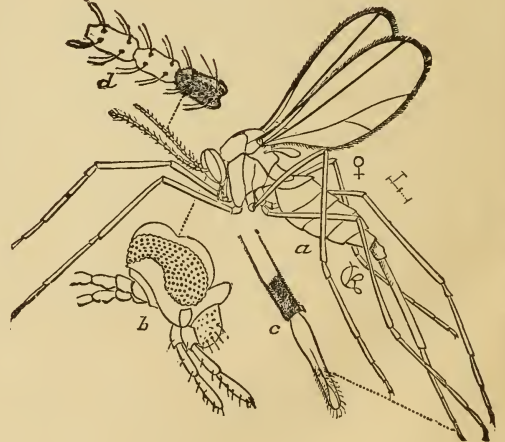


Fig. 3.

the different dates at which the insect passed through its various stages, were definitely fixed; but, when this was done, it was at once possible from this knowledge, to suggest an easy and very effective remedy. The Clover-seed Midge is a minute gnat

(Figs. 2 and 3) which lays its eggs in the forming flower heads of the clover plant in May or early in June and again during July. There are thus two broods of this insect in a season. The larvæ (Fig. 4) of the first brood attain their full growth about the end of June, when they leave the clover heads and go into the ground a short distance to complete their transformations, the perfect flies appearing about the middle of July. The eggs laid by these midges produce the second brood of larvæ which destroy the fall crop of clover seed. Part of this brood matures in September, but the remainder not until the following spring. Experience has taught farmers that the remedy suggested of feeding off their clover fields with cattle and sheep until the beginning or middle of June, or cutting it by the 20th of the same month, is the only way to secure an autumn crop of seed; thus, the grubs of this first brood (the eggs of which were deposited on the growing clover as the heads formed) are destroyed by the cattle eating them, or they dry up with the clover hay which has been cut before they were mature enough to leave the heads of clover and go into the ground to complete their stages. If the clover is left standing in the fields till the end of June, a sufficient time elapses for this latter process to take place, and the perfect flies emerge again just in time to lay their eggs in the opening flowers of the second crop. In this way, the seed of the second crop is destroyed as well as the first.



Fig. 4.

Few appreciate the fact that many of the common remedies which have now come to be pretty generally practised all over Canada, were the outcome of much labour and unremitting attention on the part of men who had devoted years of close study to the matter. The farmer who saves his crop of potatoes by dusting or sprinkling them with a mixture containing Paris green, has small thought for the continuous effort and numerous trials which were necessary before the insecticidal properties of this useful substance were discovered. Paris green, the standard remedy against all mandibulate or biting insects, is a chemical combination containing chiefly arsenic and copper, about 60 per cent. of it being arsenic. It is to this latter it owes most of its virtue as an insecticide. It is, I think, almost an ideal material for the purposes to which it is applied by entomologists. The danger of its being mistaken for some other substance of a harmless nature is reduced to a minimum by its characteristic bright green colour, the colour green being very generally recognized as indicative of poisonous properties. Its insolubility in water and under most conditions to which it is likely to be exposed, renders its use very simple, although this fact also necessitates the constant agitation, during their application, of all liquid mixtures containing it, in order that the Paris green, which is very heavy, may be kept in suspension uniformly through the whole liquid. Its fine state of division makes its dilution either with liquids or dry powders very easy, and its extreme virulence as a poison makes it possible to dilute it very much indeed without loss of its efficacy as an insecticide. It has been discovered of late years that, by mixing an equal weight of quick-lime with this arsenite, the caustic effects which sometimes follow its careless use on vegetation, can be in a large measure prevented. This discovery has simplified immensely the question of the most suitable remedy for mandibulate insects; for now a standard strength of one pound of Paris green, one pound of quick-lime and 200 gallons of water may be recommended for use on all kinds of vegetation. If it be thought more convenient to apply the poison in a dry form, it may be mixed with fifty times its quantity of any dry and finely divided powder.

The easiest way of applying Paris green to orchard trees is in a liquid mixture, by means of a force pump with a spraying nozzle. The good results which have followed the adoption of spraying as a regular orchard operation, have been so remarkable that it is now practised by all progressive fruit growers. There are various kinds of spraying

* Fig. 2a represents the male midge enormously magnified; b, the head, and c, the peculiar clasping organs still further magnified; d, the joints of the antennæ; e, the claws; f f, forms of the scales which are distributed over the wings and body. Fig. 3a, represents the female midge similarly magnified; b, the head; c, the tip of the ovipositor; d, a portion of one of the antennæ. The small lines beside the figures give the natural size of the midge. Fig. 4a, represents the larva; b, the head withdrawn into the first segment. These figures are from drawings by the late Prof. C. V. Riley,

pumps and nozzles, and the latter are quite as important as the former. We have now several good pumps manufactured in Canada; but the best nozzles are the Vermorel and the MacGowan. The former is a modification of the Cyclone nozzle, invented by Prof. Riley and his staff, of the United States Division of Entomology; the principle of this nozzle is that the liquid is forced tangentially into a small chamber, so as to strike the other side of the chamber; it is then forced through a minute central orifice, which has the effect of breaking up the liquid into a very fine spray. Too much importance cannot be attached to the fact that the liquid must be broken up into as fine a spray as possible, so that a very small quantity of the liquid may be used, and that it may be carried all through the foliage and left as a fine dew on the whole surface. In this way sufficient of the poison is deposited to destroy the insect enemies; at the same time, little is used, and there is no injury to the foliage.

During the past summer, there has probably been considerably more spraying done than ever before. This is largely due, of course, to efforts that have been made to bring this excellent method of preventing loss to the notice of fruit growers at the proper season. In Ontario much attention was drawn to the subject last year by some experiments carried out by Mr. John Craig, Horticulturist to the Central Experimental Farm, in a few orchards of Western Ontario. These experiments were very much extended and vigorously prosecuted during the past summer by instruction of the Hon John Dryden, Minister of Agriculture, who recognizes fully the value of this work to the province. The operations were put into the efficient hands of Mr. A. H. Pettit, who visited a great number of stations throughout the province, giving instructions and superintending the spraying of the orchards at regular intervals. The full account of this useful work will be published by the Department; but I may mention that Mr. Pettit has informed me that, on the whole, they have been very satisfactory.

In view of all that has been done by the Government of the country to distribute accurate information as to the best way of preventing injury to fruits by insect and fungous enemies, it certainly is a disgrace to our Canadian fruit growers that apples and other fruits are exposed for sale in this country, and exported to foreign markets in the spotted and blemished condition that is frequently the case. It is disgraceful because it is unnecessary. The two enemies, which are the cause of the greater part of this injury, are the Black Spot, a fungous disease, and the Codling Moth, the larva of which is the well-known "apple worm." Satisfactory remedies for both of these have been found; the Bordeaux mixture for the former, and Paris green for the latter. The cost of spraying these washes over the trees is very little, compared with the great saving which is made in the quantity and quality of the fruit harvested. Although it is true that the number of different kinds of insects which may attack our crops is very large, the actual number of those which are likely to appear every year is comparatively small; of these by far the larger proportion have been already studied and remedies have been published in the official reports, which are available for all who ask for them.

Before closing I must refer to one more subject, namely, the Horn-fly of cattle, which, of late years, has done so much harm among our dairy herds, but about which, from knowing the details of its behaviour since it was introduced into America, entomologists were at once able to give encouragement to dairymen, that in a year or two the virulence of its attacks would be much diminished. This prediction, I am glad to say, has proved correct; while, two years ago, in this very district, the loss in milk supplied to cheese factories was stated to be nearly fifty per cent. of the whole supply, last year it was much less, and during the present season, as far as I can learn, it has been brought down to only five per cent. Next year and thereafter, I hope confidently, that the annoyance from this insect will be reduced so much as to require no more attention than is given to-day to the ordinary cattle fly (*Stomoxys calcitrans*, L.)

Now, Mr. Chairman, I maintain that all this saving, to which I have referred, has been brought about from the development of the science of entomology. Science is a terrible word in the eyes of some people; but, after all, it is merely an illustration of the affectation of the age; some people like to use long words where short ones would do as well or better, or to use Latin where plain English would do. Science is a Latin word

which means simply knowledge, and it has been given the special signification of exact knowledge, or the best knowledge. I presume this was what Prof. James meant when he explained to us that the new agriculture was simply an outcome of the necessity, now-a-days, for farmers to have the best possible knowledge and education upon all subjects affecting their calling. I feel sure that everyone here was pleased to hear his kind words about the different societies he referred to, and most particularly proud of what he said of the work of this Society. There is no doubt that special knowledge is now necessary for farmers to compete successfully in the struggle of life. I noticed a statement in the newspaper this morning which well illustrates this fact.

Prof. Henry, one of the best known teachers of agriculture, who is at the present time doing good work at the Wisconsin Agricultural College, obtained his position owing to his practical knowledge of all the details of farming. He has always held that the best men and the best knowledge were necessary for successful farming, and used it as an argument for farmers' sons to remain on their farms and study farming in earnest. There was a vacancy at one of the other agricultural colleges for an agriculturist, and, the story goes, that Prof. Henry was asked if he could send a suitable man to fill the post at \$1,500 a year. His answer was that he regretted to say that he could not then find a man properly equipped with all the necessary knowledge of farming, but that if it had been a lawyer or a doctor that was required he could send a whole carload at \$600 apiece!

Mr. Fletcher resumed his seat amid much applause, and was followed by the Rev. T. W. Fyles, of Quebec, who read the following paper:

HOW THE FOREST IN THE DISTRICT OF BEDFORD WAS SWEEPED AWAY.

BY REV. THOMAS W. FYLES, F.L.S., SOUTH QUEBEC.

The remarks contained in this paper apply to that hilly section of the Eastern Townships which lies between the Seigniories on the one hand and Lake Memphremagog on the other, more particularly to the counties of Missisquoi, Shefford and Brome. I have known the locality for more than thirty years, and, in the early part of that period, was intimate with many of the first settlers of the district. Originally this was one vast forest, broken here and there by lakes and beaver meadows. The prevailing trees were the pine (*Pinus strobus* Lin.), the hemlock (*Abies Canadensis* Michx), the spruce (*Abies nigra* Poir), the balsam (*Abies balsamea* Marshall), the cedar (*Thuja occidentalis* Lin.), the tamarack (*Larix Americana* Michx), the maple (*Acer saccharinum* Wang), the beech (*Fagus feruginea* Ait), the elm (*Ulmus Americana* Willd.), the basswood (*Tilia Americana* Lin), the white ash (*Fraxinus Americana* Lin), the brown ash (*Fraxinus sambucifolia* Lin.) the birch (*Betula papyracea* Ait), the butternut (*Juglans cinerea* Lin.), the red cherry (*Cerasus Pennsylvanica* Linn), and the black cherry (*Cerasus serotina* Ehrhart). Some spots were named from the nature of the growth which covered them, as Pine Mountain and Spruce Mountain, in Brome.

In early days the staple productions of the district were pot and pearl ashes; and the tree that was found to yield the greatest abundance of these was the elm, and as in those days the law was administered in Montreal, and was an expensive luxury, the early settlers, many of whom were squatters, were allowed to do in the forest very much that which was right in their own eyes. Accordingly regardless of *meum et tuum*, they cut down the elms wherever they could find them, and converted them into "black salts." Consequently the elms of the primeval forest were the first of its trees to disappear. The pines followed next in order. The quality of the timber and the ease with which it was worked brought the white pine into great request. Where there was water transit, as for instance, near Lakes Champlain and Memphremagog, the clearing off of the pine was rapid. And, throughout the district local requirements could be satisfied only with the choicest timber, and all that was not of the best was accounted "vile and

refuse," and was "utterly destroyed." The old court house at Cowansville and the old church at West Shefford, in the soundness and clean grain of the pine lumber employed in them, showed the fastidiousness of their builders' choice of materials.

In the meanwhile, in the struggle for existence, the forest at large was being beaten back; and as Sampson of old said of the Philistines, so the settler might have said of his hacked and dismembered foes, "Heaps upon heaps here they lie!" Blackened piles cumbered the land, to be burned at fitting season, and their remains dragged into new pyres, until, in the language of the people, they were "quite worn out."

The first clearings for actual settlement were made where hardwood timber abounded, for it was well known that hard-wood stumps rot out in seven or eight years, whereas the stumps of black timber endure for a lifetime. The trees that were utilized in the havoc were the white ash, the brown ash and the basswood, which were split into fence rails. Now and then a cherry or a bird's-eye maple found its way to the turner's, to be converted into furniture, but too often indiscriminate destruction made room for the corn field and the potato patch. Often when the maples were spared to form a sugar bush, carelessness and ill-usage insured speedy decay. I frequently saw trees tapped by the acre with slanting gashes a foot long and two or three inches deep, a proceeding which impaired the circulation of the sap, producing a diseased condition of the tree, which, as we shall presently see, was peculiarly inviting to the attacks of injurious insects. Those were the days when stately specimens of the basswood (the lumber of which would now be worth \$20 per thousand) were felled and notched into sections, which were split off and roughly shaped into sap troughs, the larger portion of the wood being wasted in the process.

As the clearings were enlarged and the dairy afforded more employment and greater profits, the traffic in "black salts" died out, and a second period in the history of the district may be said to have been reached. A third and striking era was opened when, by the enterprise of the late Hon. A. B. Foster, the railway to Waterloo was completed. Not only did farm produce meet with a readier sale, but a demand for hemlock bark, to supply the southern markets, arose, and men turned their attention more closely to the black timber. The short interval between the hoeing season and hay-time was diligently turned to account in peeling bark—the stripped hemlocks being allowed to lie as they had fallen. In consequence tangled slashes often disfigured the uplands, until a second growth—usually of poplar—hid their deformities.

Hitherto we have considered man's work in stripping the land of its bosky covering, but the elements played no unimportant part towards the same end. Fierce winds from the low-lying "French country," compressed in the valleys and defiles, again and again rushed up the mountain sides, and wherever they found a break formed by new settlements, impinged upon the exposed edges of the forest, and tumbled many goodly trees over, as if some huge monster were rooting amongst them. I know one spot where, for some acres, the trees, after a hurricane, lay in swaths, like grain from the scythe of the mower.

But, if the wind slew its thousands, fire may be said to have slain its ten thousands. The heedless and untimely burning of a brush heap often started a conflagration which extended for miles. One of the first inhabitants of Iron Hill told me that the grandest sight he ever saw was the fire rushing up through the pine woods on the western slope of Brome mountain. In May, 1877, I rode with the late Sheriff Cowan from Cowansville to Philipsburg, and men were pulling down fences and "fighting fire" all along the way. And at Philipsburg clouds of smoke, sweeping across Missisquoi bay, told that the fire was raging in the State of New York. Great damage was done to the second growth sugar woods by this conflagration, and for several years after maple wood was a *bon marche*.

In addition to man and the elements, an innumerable yet unobtrusive army of sappers and miners worked upon the forest trees—grubs of beetles and horntails, and caterpillars of moths. I shall speak of but a few kinds that attacked (1) the "black timber," (2) the hard woods, (3) the poplars.

(1) I remember standing in the chancel of a new church which I had built in the township of Brome in 1864, and hearing from the floor a slight rasping sound, I watched attentively, and presently the jaws and head of a Buprestis larva (Fig 5*a* and *c*, the larva and head; *b* pupa, *d* beetle), appeared through a hole. I looked around me and saw that there was a row of holes wherever the flooring rested upon a sleeper, and I found that the sleepers had been made of small spruce and hemlock trees hewn a little on the upper side. These trees were the habitations of Buprestidæ, the larvæ of which, having at this time attained their full growth, had gnawed their way through an inch of floor-lining, and an inch and a quarter of spruce boarding to the upper air, that they might enter upon the pupal condition satisfied that a way of exit had been secured for the coming imagoes.

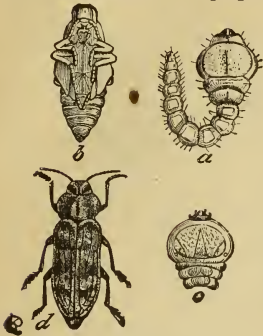


Fig. 5.

with antennæ of twice that length. This creature often presents itself unexpectedly in strange quarters. One afternoon I was sitting in my study in the rectory at Cowansville, which was then a new building, when suddenly a strange object came down with a great clatter upon the book I was reading. It was *M. confusor*. "Where did you come from?" I said. I looked round and soon discovered a hole recently made in the casing of the door. What an experience that insect had gone through! It had sprung from an egg laid in a crevice of a standing pine. The tree into which it had eaten its way had been cut down, hauled about in the woods, soaked in the mill-pond, and cut up by the circular saw. The boards had been banged about in the piling, had been kiln-dried, and then passed through a planing-machine. That particular board in which the beetle had had its habitation had been worked by hand in "the sash and door factory;" had been planed and fitted, and hammered and painted; and yet—surviving all the rough usage, and escaping all the deadly weapons—there had lain *M. confusor* snugly ensconced in his square-inch, or so, of wood, reserving himself until he could present himself as a gentleman. (Fig. 6.)



Fig. 6.

Another beetle closely related to *M. confusor*, and of similar habits is *Monohammus marmorator* Kirby. It is somewhat smaller than *M. confusor*, and has shorter antennæ. In color it is brown, marbled with pale yellow.

A third insect belonging to the same genus is *Monohammus scutellatus* Say, (Fig. 7). It is called by the French-Canadians, "*Le Forgeron*"—the Blacksmith. It is deep bistre in hue, and has a white scutellum. During the past season (1895) this insect has been unusually numerous and destructive. In the spring one of my neighbors planted an extensive hedge of spruce around his grounds. By the end of summer nearly every scion had been girdled or partially so by the *Forgeron*. The larvæ of the species are even more destructive than the perfect beetles. I have seen a fine, large, spruce tree snap off, two feet from the ground, under pressure from the wind, and, on examination, have found that the stem was tunnelled through



Fig. 7.

and through—scores of the *Scutellatus* larvæ having mined and countermined it in all directions.

(2) The hardwood also affords food and lodging to various insects. The handsome beetle, *Glycobius speciosus* Say (Fig. 8) (whose black and yellow livery is so suggestive of hornets and stings, but is *speciosus* notwithstanding) is frequently found in our wood-sheds, having arrived at perfection in the maple, the best of our fire-wood.

But there is a creature that far more extensively assists or accompanies the decay of the hardwood trees. It is one of the Horn-tails, *Tremex columba* Linnæus—an insect belonging to the order hymenoptera. The female *Tremex* is provided with a strong, black, bristle like ovipositor, which proceeds from the centre of the abdomen, and, when not in use lies extended beneath and beyond that section in a fixed and protecting sheath. In depositing its eggs the creature withdraws the ovipositor from its sheath raises its body and drives the appendage through the bark and into the soft wood, laying its eggs therein. As soon as the young grubs are hatched they begin to tunnel the wood, enlarging the bore as they increase in size. By the end of the first season they attain the dimensions of thread worms. The full grown larva is an inch and a half in length and has a waxen appearance. Its mandibles have a ferruginous tinge and its spiracles are light brown. The prop-legs are imperfect and the body terminates in a short spine.

Long observation has led me to believe that the Horn-tails and other borers do not attack *sound and healthy trees*. I stated this belief in a lecture I gave in the Somerville course some years ago. Since then I have read the Rev. J. G. Wood's "Insects at Home," and I am glad to find that some remarks of his bear out my statement. Speaking of the dreaded *Scolytus destructor* Olivier of Europe he says :—

"It is much doubted whether the *Scolytus* ever attacks a healthy tree, principally, as is conjectured because in such trees the burrows of the insects are filled with sap which not only drives out the beetles but prevents their eggs from being hatched. Still when a tree becomes unhealthy the attacks of the *Scolytus* prevent it from recovering itself," etc.

A tree struck by lightning, or broken by the wind, or scorched by fire, or hacked and abused by man is the chosen object of insect spoilers.



Fig. 8.



Fig. 9.

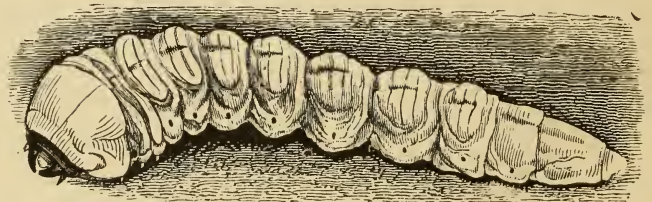


Fig. 10.

I have spoken of the waste of hemlock which followed upon the first demands for tanbark. Felled hemlock trees that are not soon sent to the sawyer's, are sure to be confiscated by a sawyer of another kind, *Prionus unicolor*, as Harris calls it—the one-coloured sawyer—the *Orthosoma brunneum* of Forster. (Fig. 9.) For nature not only abhors a vacuum; she also abhors waste. A standing hemlock in the last stage of its existence

produces the *Boletus igniarius* which nourishes the Toad Beetle, *Boletophagus corticola*, Say. A fallen hemlock becomes the food of the Prionus grubs. (Fig. 10.) The creatures are well known to every farmer who has had to clear his land of the half rotten trophies of his early triumphs over the wilderness.

It yet remains for me to say a few words (3) concerning a borer which attacks the poplars, the latest growth on neglected brush lands. The insect is *Cossus centerensis*, Lintner. It belongs to the order lepidoptera. The perfect insect is a large moth with crape-like wings, dark grey in colour, reticulated with fine black lines. It makes its appearance in July. The male is smaller than the female. The presence of the larva is betrayed by the *frass*, or half digested sawdust, which it throws out, in early summer, from its burrow in the tree. On attaining its full size, the caterpillar retires some inches into the tree, and assumes its chrysalis condition. In due time, the chrysalis, by means of a series of serrated rings on its body, works its way along the tunnel bored by the larva, to the surface of the tree, and forces itself through, so as to clear its wing cases. The skin then bursts, and the perfect insect makes its escape.

In bringing this brief history to a conclusion I would bear in mind that the aim of all historians should be to convert the mistakes of the past into lessons for the future; and I would offer a few practical hints:—

I. Believing in the powers of the press, I would commend to all newspaper editors the practice of devoting a column to the discussion of rural affairs. Under a judicious editor the practice is invaluable, for many men in country places read the newspaper, and read little else.

II. In all normal and training schools, teachers should be led to see the importance of training the young in habits of prudence, forethought and economy. For want of the exercise of such qualities in his early days many a farmer has now to buy his firewood, or to obtain it from a distance at the expense of much time and labour.

III. I would recommend farmers to thin out their sugar woods, plantations and copses, so that the trees may have ample room to spread their roots and obtain a firm hold on the earth, that they may not easily be overturned by a tempest.

IV. I should say, do not over-prune, and prune in the winter when the sap has ceased to work. Cover all wounds with grafting wax or oil-paint. Neglect of these precautions will throw the trees into a condition which will assuredly invite the attacks of destructive insects.

Lastly, I should say, tap your maple trees with care; use a duck-bill augur and cedar spouts, which "give" and do not split the bark.

A cordial vote of thanks to the Mayor, for his kindness in presiding on the occasion and allowing the use of the city hall for the meeting, was proposed by Mr. Dearness, who spoke very happily of the pleasure and instruction which they had all received from the addresses of the evening, and was seconded by Mr. Saunders, and adopted by the meeting with much applause.

Mr. E. R. CAMERON then moved, seconded by Mr. S. H. CRAIG, a vote of thanks to the speakers who had come from a distance to address them, and had afforded them so much gratification. After putting the motion, the meeting was closed with a few pleasant remarks from the Mayor, who wished the Entomological Society of Ontario a long continued and prosperous career.

THURSDAY, NOVEMBER 28TH.—MORNING SESSION.

The meeting was called to order at 10 o'clock, a.m., the chair being taken by Mr. Fletcher. The reports of the various sections of the Society were presented and read by their respective secretaries.

REPORT OF THE BOTANICAL SECTION.

The Botanical Section beg to submit the following report for the summer of 1895 :

Regular weekly meetings of the section were held from April 22nd to October 19th. The average attendance was considerably in advance of that of the previous year. A number of the public school teachers of the city joined the Society, and became industrious workers in our section. For the benefit of those just beginning the study of botany, a part of each meeting was devoted to the study of some important natural order, illustrated by typical specimens collected by the members.

Papers upon the following subjects were read at different meetings :

1. "The Humanity or Civilization of Plants and Flowers," Prof. J. H. BOWMAN.
2. "The Relation of Chlorophyll to the Forms of Plants," W. T. McCLEMENT.
3. "The Distribution of Plants in Ontario, with Special Reference to the London District," Mr. J. A. BALKWILL.
4. "The Dissemination of Seeds," W. T. McCLEMENT.

One public field day was held, July 1st, when the members and their friends visited Komoka, and made large and beautiful collections, the feature of the day being the abundance of *Cypripedium spectabile*.

During the season the following plants were added to the local list :

Spergula arvensis—Mr. J. A. BALKWILL.

Arctostaphylos Uva-ursi—Prof. J. DEARNESS.

The section have deemed it wise to direct their attention to the arrangement of a Flora of Middlesex county. A good start has been made toward this, as we have the list of *Polypetalous* and *Gamopetalous Exogens* ready for final revision. We have to thank Mr. Fletcher for a number of rare and interesting plants from the Ottawa district, which he donated to the Herbarium.

W. T. McCLEMENT, Secretary.

Mr. FLETCHER spoke of the value of the proposed Flora of the County of Middlesex. He also stated that *Spergula arvensis*, which had recently been found in the neighborhood of London, was recommended by the Michigan State Agricultural College for introduction as a fodder plant, but in Europe it was regarded as a persistent and troublesome weed, and was found to bear the same character in some parts of Canada. He strongly deprecated its introduction by farmers into this country.

REPORT OF THE GEOLOGICAL SECTION OF THE ENTOMOLOGICAL SOCIETY FOR THE YEAR 1894-95.

We have much pleasure in reporting to your honorable body that the Geological Section has had a most prosperous year. Our membership has increased; the average attendance at our meetings has been greater than during any previous year.

Many valuable additions have been made to our private collections since last we reported progress, but we are still looking forward to the formation of a central collection in our city, to which the members of our Society and all our citizens may have free access.

The section would suggest that it would be a great advantage to students of mineralogy if some steps could be taken by which the small number of Geological and Natural History societies in the Province could be provided with small collections of accurately named specimens of the chief economic minerals.

The members of our section have made trips to a number of places of geological interest, including Rockwood, Elora, Guelph, North Dorchester, and the mammoth and colossal Caves of Kentucky.

Valuable papers have been read before our section, showing the methods of gold mining in Australia, Colorado, Ecuador and Madoc.

Addresses on the following subjects have been made by various members of our Society :

- 1 "Trip to St. Joseph's Island." By Mr. MORRIS.
- 2 "Australian Gold Fields," Mr. WEBB.
- 3 "Crystallography," Dr. WILSON.
- 4 "Canoe Cruise on Lake Nipissing," Mr. ALLISON.
- 5 "Physical Basis of Knowledge," Mr. SCARROW.
- 6 "Correlation of Forces," Mr. B. GREEN.
- 7 "Trip to Mammoth Cave," Dr. WOLVERTON.

Signed on behalf of the Geological Section by

G. F. SHERWOOD, Secretary.

S. WOOLVERTON, Chairman.

REPORT OF THE MICROSCOPICAL SECTION OF THE ENTOMOLOGICAL SOCIETY.

The season opened with the first meeting on October 12th, and continued every second week till March 29th, at which time, as is usual, we discontinued in favour of the Botanical Section, of which nearly all the microscopists are active members.

Regular Meetings.—There have been twelve such. Interest has been well sustained throughout the season, meetings regular, attendance good, subjects excellent and well presented. More than usual the members have engaged in practical work. Among the subjects were: "The Study, Dissection and Mounting of Earthworms," led by Dr. Hotson; "Fungi" (Hymenomycetes), and "Wood Sectioning, Staining and Mounting," led by Prof. Dearness; "Insect Mounting Without Pressure," also "Cell Building," by Mr. Rennie; "Brownian Movement," led by Mr. W. T. McClement; "Fluid Mounting of Green Algæ," also "Collection and Mounting of Diatoms," led by Jas. H. Bowman. Very many microscopical plants were brought in by members and furnished many an enjoyable hour.

Open Meetings.—Of these, two were held, and, as usual, attracted a large attendance and were well appreciated by those for whom they were intended. In this connection we would say that we find our present quarters very ill-suited for this class of meeting. Had we held the same in some more convenient place, no doubt a great and favorable difference would be observed.

Outings—These are not so frequent as they might, and would be, if it were not that we occupy only winter months. We have, however, the benefit of the botanists' excursions in the summer time as our members who are botanists are always thinking of our section and preserve their finds and work up their subject in connection with them for our meeting season.

JAS. H. BOWMAN,
Secretary of Section.

REPORT FROM THE ENTOMOLOGICAL SOCIETY OF ONTARIO TO THE
ROYAL SOCIETY OF CANADA.

BY THE REV. THOMAS W. FYLES, F.L.S., DELEGATE.

I beg to state respectfully that the Society I have the honour to serve on this important occasion, is in a healthy and growing condition—sound financially, possessing a large amount of *materiel*, and held in estimation at home and abroad.

It is to be expected that the subject of economic entomology will commend itself more and more amongst the intelligent members of a fruit growing and agricultural community. The insect enemies of the farmer and gardener are numerous and persevering, and accomplish incalculable harm; and a society that studies the life histories of these foes, and searches for checks upon their efforts, can hardly fail to win adherents and to command support. Accordingly we find that at the thirty-second annual meeting of our Society the council was able to congratulate the members upon "the steady increase in numbers which continued to take place, and the hearty interest that was maintained in the various departments of the Society's work."

The headquarters of the association are in London, the chief town of one of the most important agricultural and horticultural sections of Ontario, and a fitting centre for a society which is aided by the Ontario Government, and is intended to promulgate practical information amongst the cultivators of the soil, as well as to foster scientific research. The Government grant made to the Society annually is \$1,000.

That the Society is doing the work expected from it, and doing it well, may be shewn on sufficient testimony. Thus Mr. L. O. Howard, Chief Entomologist of the Department of Agriculture, Washington, says of it: "The Society has conscientiously complied with the conditions of the grant. Its reports published annually have greatly increased in size, and in the general interest of their contents. They have contained much matter of economic value as well as of educational interest." And the editor of an English magazine speaks of the report last issued as one of more interest to him than all others received from America. Doubtless the Society, with a larger grant, could accomplish more good.

The annual meeting, to which I have referred, was held on the seventh and eighth days of November last. The value of the addresses and of the papers read, and the beauty and rarity of the specimens exhibited on this occasion were fully appreciated by those who were privileged to attend. The President's address was particularly valuable as an instructive sketch, *historical* and *geographical*, of the Society and its work. It was learnt from it that the society has observers and correspondents from east to west throughout this vast Dominion—from St. John, N. B., and Halifax, N. S., to Esquimalt in British Columbia and Masset in Queen Charlotte Islands. A very valuable paper on "The Rhoplocera of the Eastern Provinces of Canada," was read on this occasion by the Rev. Dr. Bethune, editor of the *Canadian Entomologist*. It gave a complete list of species and the names of the localities in which each local kind has been taken with—as far as is known—the food plants of the different species.

The titles of the other papers read at the meeting are as follows:—

"Insects Collected in Bermuda During the Winter of 1894," by Gamble Geddes, Toronto.

"Common Names for Butterflies—Shall We Have Them?" by H. H. Lyman, Montreal.

"The Pitcher-Plant Moth," by James Fletcher, Ottawa.

"*Catastega aceriella Clemens*, *Semasia signatana Clemens*," by the Rev. Thomas W. Fyles, South Quebec.

"Notes on a Few Canadian Coleoptera," by W. Hague Harrington, F.R.S.C., Ottawa.

"Food, Feeders, and Fed," by Rev. Thomas W. Fyles, F.L.S., South Quebec.

"An Attack of *Ephestia interpunctella*," by H. A. Stevenson, London.

"The Economic Value of Parasitism," by F. M. Webster.

"The Re appearance of *Pieris Protodice Boisdu.*," by J. Alston Moffat, London, Ont.

"Remarks on the Structure of the Undeveloped Wings of the Saturniidae," by J. Alston Moffat.

"Bordeaux Mixture as a Deterrent Against the Flea Beetles," by L. R. Jones, Burlington, Vermont.

"The Gypsy Moth," by James Fletcher, Ottawa.

"The San Jose Scale," by James Fletcher, Ottawa.

"Injurious Fruit Insects of the Year 1894," by James Fletcher, Ottawa.

The twenty-fifth annual report, issued by the Society, contains portraits of Professor William Saunders, F.R.S.C., President of the Society from 1875 to 1886, and Augustus Radcliffe Grote, A.M., one of the Society's honorary members, and it is also illustrated with sixty figures of insects.

Besides the President's address and the papers above-mentioned, the report contains.—

The minutes of the meeting.

The Report of the Librarian and Curator, Mr. J. Alston Moffat.

The Report of the Montreal Branch, presented by Mr. H. H. Lyman, President, and signed by Mr. A. F. Winn, Secretary.

The Report of the Geological Section, presented by Dr. S. Woolverton, Vice-Chairman.

The Report of the Botanical Section, presented by Mr. W. F. McClement, Secretary.

The Report of the Delegate to the Royal Society of Canada.

A very valuable abstract of the proceedings of the sixth annual meeting of the Association of Economic Entomologists, supplied by Mr. L. O. Howard, Entomologist of the Department of Agriculture, Washington, and Mr. O. L. Marlatt, Secretary of the meeting; and a number of interesting notices, critical, biographical, etc.

This report is distributed "not only to our own members, but to every member of the Fruit Growers' Association, to members of Parliament, the Mechanics' Institutes, etc., making an issue of 6,000 copies, (W. H. Harrington, *Canadian Entomologist*, vol. XXVI., p. 2.)

The Society's library now numbers 1,361 volumes—seventy-seven having been added in the course of the year.

Important additions have been made to the Society's collections of insects. In its cabinets may now be seen representatives of 1,077 species duly classified and named.

The Society is fortunate in retaining the services of Mr. J. Alston Moffat as Librarian and Curator. By his methodical habits, his manual skill in mounting specimens, and his extensive knowledge of the lepidoptera, Mr. Moffat is peculiarly fitted for the position he holds.

During the year the various sections of the Society have held field days at St. Mary's, Dorchester, Kilworth, Byron, Komoka, Kettle Point (Lake Huron), Ilderton, Thedford, Beechville, Woodstock, Mud Lake and other places. The value from an educational point of view of such expeditions in a neighborhood that possesses such experienced scientific guides and instructors as Messrs. W. E. Saunders, J. M. Denton, J. A. Balkwill, J. W. Dearness, J. H. Bowman, Dr. S. Wolverton, R. W. Rennie, all long connected with the Society, besides younger and enthusiastic men, is beyond estimation.

The *Canadian Entomologist* has reached its twenty-seventh year. The volume for 1894 contains articles from sixty-one contributors—fourteen residing in Canada, forty in the United States, five in England, one in Germany and one in Sweden. In its pages are described no less than seven new genera and ninety-five new species of insects. The magazine continues under the able management of the Rev. O. J. S. Bethune, D.C.L., F.R.S.C., etc.; and it is a striking proof of the courage and perseverance of its editor that notwithstanding the cares and anxieties that must have thronged him, through the destruction by fire of his noble school buildings and the beautiful chapel attached to them, the *Canadian Entomologist* has made its appearance as regularly as ever and as carefully edited.

Hitherto the Entomological Society of Ontario has studied the life-histories of insects, the methods of attack of the pests of the homestead, the storehouse, the garden, the orchard, the field and the forest; the ways for circumventing these foes; and the nature and application of insecticides. Much, no doubt, remains to be learned on all these subjects. But the attention of naturalists has of late been drawn to a new and most important matter. It is, to use the heading of one of the papers published in the Society's report that has been mentioned, *The Economic Value of Parasitism*. It is well to know how to meet enemies ourselves, but it is better sometimes to know how to direct faithful allies against them. If the parasite (*Diplosis grassator* Fyles), which keeps down the numbers of the Phylloxera in this country, had been carried over to Europe, it would doubtless have saved many a vineyard that has disappeared. The introduction of the Australian Lady-bird (*Vedalia cardinalis* Mulsant), the foe of the "Fluted Scale," has probably saved the orange groves of California from extinction. The predaceous beetle (*Clerus formicarius* Linnæus) has lately been introduced into Western Virginia by Professor Hopkins, as a check upon the "Borers" that have wrought such destruction in the spruce forests of that country. And this bringing about of good by the directing of insect agents is only in its beginning. As our knowledge increases we shall in all probability be able to gather and control forces that at present are but little understood.

ELECTION OF OFFICERS.

The following gentlemen were elected officers for the ensuing year :

President—J. W. DEARNESS, London.

Vice-President—H. H. LYMAN, Montreal.

Secretary—W. E. SAUNDERS, London.

Treasurer—J. A. BALKWILL, London.

Directors—Division 1. JAMES FLETCHER, F.L.S., F.R.S.C., Ottawa.

" 2. REV. O. J. S. BETHUNE, F.R.S.C., Port Hope.

" 3. GAMBLE GEDDES, Toronto.

" 4. A. H. KILMAN, Ridgeway.

" 5. R. W. RENNIE, London.

Librarian and Curator—J. ALSTON MOFFAT, London.

Editor of the "Canadian Entomologist"—REV. C. J. S. BETHUNE, M.A., D.C.L., Port Hope.

Editing Committee—J. FLETCHER, Ottawa; H. H. LYMAN, Montreal; REV. T. W. FYLES, South Quebec; J. M. DENTON, London.

Delegate to the Royal Society—J. D. EVANS, Trenton.

Committee on Field Days—Dr. WOOLVERTON, MESSRS. SHERWOOD, McCLEMENT, BALKWILL, W. STEVENSON, W. E. SAUNDERS, ANDERSON, ELLIOTT, RENNIE, and BOWMAN, London.

Auditors—J. M. DENTON and J. H. BOWMAN, London.

FIELD DAYS.

A discussion on Field Days and the best methods of conducting them was participated in by most of the members present. Mr. Fletcher described the plan adopted by the Field Naturalists' Club of Ottawa, which had proved very successful. It was decided that every effort should be made next summer to develop the system and that the annual meeting of the Society should, if possible, be held in August in order to have a general outing for the members in connection with it.

THE CANADIAN ENTOMOLOGIST.

A discussion was next carried on by Messrs. Balkwill, Rennie, Dearness, and Fletcher as to the possibility of reducing the expense incurred in the publication of the *Canadian Entomologist*. The treasurer and editor were instructed to confer with the publishers on the subject. Mr. Dearness suggested that a leaflet should be printed for enclosure in correspondence, setting forth the advantages of membership in the Society.

AFTERNOON SESSION.

The meeting was called to order by the President, Mr. J. W. Dearness, at 3 o'clock, p.m.

Papers were presented by Mr. Moffit on "Observations on the Season of 1895," "Variation, with Special Reference to Insects," and "The Growth of the Wings of a Luna Moth."

Mr. Fletcher gave an interesting address on his trip to British Columbia during the past summer, which was undertaken for the purpose of collecting and observing insects and plants throughout the region traversed. He illustrated his remarks by exhibiting a beautiful collection of dried plants that he had made, and several boxes of rare and remarkable insects.

A fine specimen of the exceedingly rare elater, *Sarpedon scabrosus*, was exhibited by Mr. J. D. Evans, who had taken it during the past summer at Trenton, Ont.

The receipt of valuable donations to the Society's collection of insects was announced from the Rev. G. W. Taylor, Nanaimo, B.C., Mr. E. Firmstone Heath, the Hermitage, Cartwright, Manitoba, and C. de Blois Green, Oroyon, B.C., and the hearty thanks of the Society were accorded to the donors. Dr. Bethune stated that arrangements had been made for the exchange of publications from the year 1868 with the Entomological Society of France, whose "Annals" would form a very important and valuable addition to the library.

Much time was very enjoyably spent by the members during both the days of meeting in exhibiting rare captures, examining the cabinets and books of the Society, and comparing notes on many interesting entomological subjects.

INSECT INJURIES OF THE YEAR 1895.

By JAMES FLETCHER, OTTAWA.

The insect injuries to the crops of the province during the past season have been almost entirely by well known pests.

Cereals.—Grain crops have suffered very little; the most serious injuries were by "grasshoppers." These developed in large numbers all through those districts where

drought prevailed, and did much harm to grass, oats and barley. The species which were most abundant were *Melanoplus femur-rubrum*, *M. atlantis* and *M. bivittatus*. Cutworms (Fig. 11) were less complained of than usual, taking the province as a whole. *Hadena arctica* and *Hadena devastatrix* occurred abundantly in the extreme western counties. Hessian fly was sent in from the Muskoka district; and also the joint worm (*Isosoma hordei*), Fig. 12, the latter attacking wheat and injuring it to the extent of five per cent. at Meaford, Ont.



Fig. 11.

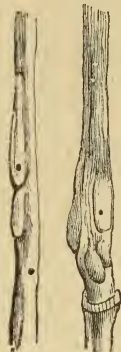


Fig. 12.

Fodder Plants.—Under this head, undoubtedly the greatest damage was done by grasshoppers, and farmers will do well next season to examine their grass lands early in the season before the grass is too high, to see if there are many of the young, and if so, to use one of the different “hopper-dozers” or oil pans which are used to such good effect in the Western States. The Pea Moth has continued its injuries, and up to the present no practical remedy has been discovered. I commend this insect to the particular attention of our members. Although known as so abundant and injurious for the past twenty years, the perfect insect in this country has never yet been identified.

Roots.—The Colorado Potato-beetle still exists in great numbers, but with so cheap and effective a remedy as Paris green, it cannot be considered a serious enemy except by the lazy or careless. The larva of *Gortyna cataphracta* was sent in from three or four places in Eastern Ontario as having bored into the stalks of potatoes, tomatoes and many other garden plants. A new attack on potatoes reported this year for the first time was by *Otiorynchus ovatus*, which was sent from Fenella, Ont., by Mr. J. B. Brook, who had found it girdling the stems of his potatoes. The same insect was found injuring young apples, pears and currants at Arthabaskaville, Que. Turnips were badly attacked all over the province by the Turnip Aphis, and many reports were received. There is no very satisfactory remedy for this insect. Careful watch should be kept in August when hoeing and thinning turnips. At that time the colonies are small and few in number, and if care be taken to destroy them then, much may be done to control the outbreak. Spraying with kerosene emulsion was found to be useful when the colonies were not too numerous. A tobacco and soap wash would be equally effective. The Diamond-back Moth (*Plutella cruciferarum*) was also abundant both on turnips and cabbages, but affected the crop very little. Cabbage and Onion Root-maggots were as usual abundant in many places, and did much harm. The Imported White Cabbage Butterfly (*Pieris rapae*), Fig. 13, is not now considered a very serious enemy where the use of pyrethrum powder and flour (one to four) is practised. The best way to apply the remedy is to dust it over the cabbages as soon as the work of the larvæ is noticed, by means of small hand bellows or from a muslin bag. It cannot be too strongly insisted upon that Paris green must never be used on cabbages.



Fig. 13.

Fruits.—The injuries to fruits cannot be said, as compared with other years, to have been very serious. Most of the usual pests have put in an appearance and done some harm, but the more general adoption of the excellent practice of spraying regularly is having a noticeable

effect. Codling moth, Plum curculio, Canker-worm, Eye-spotted Bud-moth, Tent caterpillars and Fall Web-worm have been abundant in some places, but their numbers have been brought down considerably wherever spraying with the arsenites was resorted to.

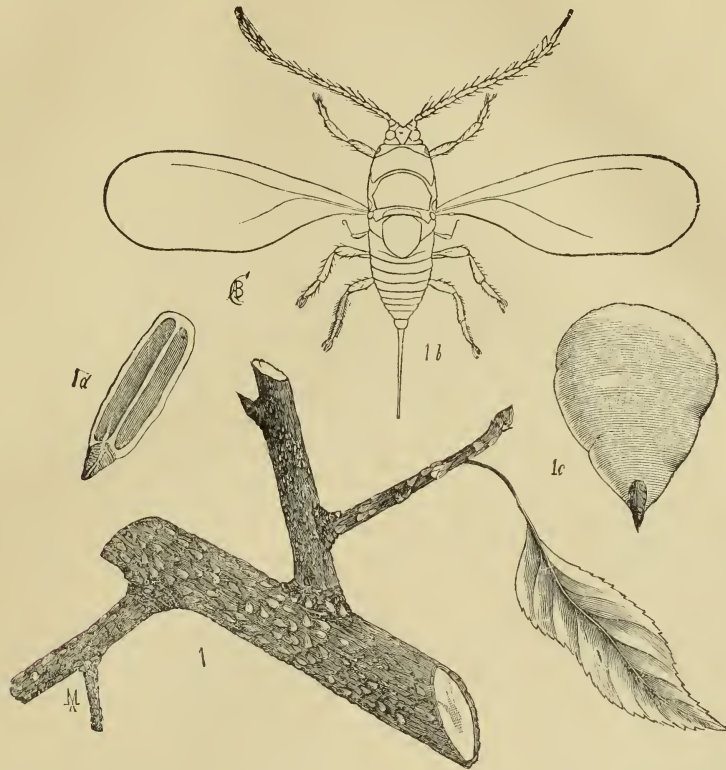


Fig. 14.—1, twig with scales ; 1a, scale of male ; 1b, winged male ; 1c, scale of female—highly magnified.

The Oyster-Shell Bark-louse is abundant throughout the province, and where orchards are neglected does much harm. Spraying with kerosene emulsion when the young insects emerge from the old scales, about 1st June, is the best remedy. The Scurfy Bark-louse, *Chionaspis furfurus*, Fig. 14, was sent from Essex County. One tree was badly infested, but a thorough spraying with kerosene emulsion entirely cleaned it.

The New York Plum-scale (*Lecanium*) has been found, on enquiry, to be present to some extent all through the Niagara peninsula and in some other western counties. Only two bad occurrences have been discovered, and I am much pleased to be able to report that these have both been eradicated by treatment with kerosene emulsion. The life-history of this scale is quite different from that of the Oyster-Shell Bark-louse. In this species, the young emerge at the end of June and make their way out on to the foliage, where they remain without growing much until autumn ; they then crawl back again on to the twigs and branches and hibernate there. When revived by the return of spring, they move again and fix themselves to the young wood, chiefly on the lower side of the smaller branches. They grow very rapidly in spring, and the tiny flat scales which hibernated, soon become large, conspicuous, dark brown, hemispherical scales, varying somewhat in size, but about one-eighth to one-sixth of an inch in length by about half of that length in height. The basal outline is ovate or almost round, being very nearly as wide as long. This insect has been carefully studied by Mr. Slingerland, of Cornell University, and the remedy which he suggested has been used very satisfactorily both at Queenston and Grimsby, where the two serious outbreaks referred to above occurred.

This treatment is to spray infested trees at least twice during the winter with a strong kerosene emulsion wash—the Riley-Hubbard emulsion diluted with only four parts of water. This did no harm to the plum trees, but quite destroyed the scales.

Canker-worms (*Anisopteryx*). There has been a good deal of enquiry during the past season as to the best way to treat Canker-worms in orchards. There can be no doubt about the superiority of spraying with Paris-green over all other methods, where the trees are small enough to be reached easily with an ordinary spraying nozzle; but where trees are old and large, some growers still prefer to use the old method of banding the trunks of the trees with printers' ink and oil or some other viscid material. Mr. O. T. Springer, of Burlington, Ont., uses a mixture consisting of castor oil, two pounds and resin, three pounds, heated and thoroughly mixed. This is painted directly on the tree trunks in autumn and spring. In Nova Scotia, printers' ink is reduced with fish oil, and this is painted on strips of thick paper which have been previously tacked round the trunks. Mr. E. J. Armstrong, of Church Street, Cornwallis, in the Annapolis valley, informed me, when enquiring why he preferred banding to spraying, that the chief reasons were that the trees in Nova Scotia were large, and it was the practice to grow other crops in the orchards, and, besides, injury had been done by careless spraying. He gives the cost of this treatment about as follows: Printers' ink is about twelve cents a pound; twenty pounds of ink will require four gallons of fish oil, at fifty cents a gallon. This amount will answer for an orchard of five acres, the trees being of about twenty or thirty years. It will require about fifteen pounds of paper, at four cents a pound. This is cut with a saw from the roll in strips six inches in width. Two men, armed with a sharp knife and a tack hammer, can go over an orchard of five acres in half a day, the first man measuring the tree and cutting off sufficient paper to band it, the second one tacking it on. The ink is applied in autumn and spring with a paint brush, and the paper put on in autumn is ready for the next spring.

The Cigar Case-bearer (*Coleophora Fletcherella*), which has done so much harm to apples in Ontario and Nova Scotia during the past four or five years, and of which I spoke last year, has been the cause of much loss again this year. Spraying with kerosene emulsion, directly the young caterpillars begin to move out on to the buds in spring and spraying regularly two or three times at short intervals of four or five days with Paris green, one pound to 200 gallons, have both been attended with a measure of success; but this is an exceedingly difficult insect to destroy, owing to the fact that the caterpillar feeds mostly on the inside tissues of the leaf, merely eating a small hole through the outside skin so as to get at the inner tissues, which it mines out in a large blotch mine as far as it can extend its body from its case. Mr. Edwin Worden, of Oshawa, has, during the past summer, sprayed his trees with a Paris green and lye wash, which he writes me has been most satisfactory. The first time he used this remedy he sprayed with concentrated lye only. This was about the middle of May, 1894, and Mr. Worden was under the impression that the application had not killed many of the Case-bearers; but the effect was very beneficial, and he could see distinctly where the spraying had been done by the cleanness of the trees from moss and Oyster-Shell Bark-louse. Last summer he sprayed again with three cans of concentrated lye and one quarter pound Paris green in forty-five gallons of water, and secured the best of results; he particularly states that the lye did not injure the foliage at all. This spraying was done in the beginning of June, and Mr. Worden's object was to destroy at the same time the Codling Moth, the Cigar Case-bearer and the Oyster-Shell Bark-louse. No doubt many other pests would be killed at the same time, such as the Canker-worm, Eye-spotted Bud-moth, Leaf Rollers, etc.

The Peach Bark-borer (*Phloeotribus liminaris*) which has for some years done so much harm in the peach orchards of the Niagara Peninsula, has this year been successfully treated by Mr. O. E. Fisher, of Queenston. Noticing that the perfect beetles became active very early in the spring, he washed his trees then with a strong alkaline wash to which carbolic acid had been added. He made his wash as follows: Five pounds of washing soda, three quarts of soft soap, and enough water to make six gallons. Air-slaked lime was then added sufficient to make it of the consistency of thick paint. To all this was added three tablespoonfuls of Paris green and one ounce of carbolic acid.

This mixture was applied with a whitewash brush, thoroughly covering the entire trunk of the tree and a few inches up on the limbs. Mr. Fisher reports that at the end of the season he is quite satisfied with the results of the treatment. It would appear from what I have just said that two applications of this mixture, the first one being made as soon as the beetles become active, sometimes as early as March, and another six weeks later, would provide us with an effective remedy for this little pest, which for some years has done considerable harm in our Canadian peach orchards.

Black Peach Aphis (*Aphis persicæ-niger*).—The only new fruit pest of any importance which has appeared in the province during the past season is the Black Peach Aphis, of which specimens have been sent in from two orchards at Leamington, in Essex county. The insect has undoubtedly been imported from the United States on young nursery stock. There are two forms of this insect, one attacking the twigs, the other, more injurious and much more difficult to treat, occurring on the roots. Prof. John B. Smith, of New Brunswick, N. J., who has studied this Aphis a great deal, states that the form on the twigs is easily controlled with kerosene emulsion; and the underground form he has successfully treated with heavy top dressings of kainit. He recommends for light soils in New Jersey about ten pounds per tree, covering the probable extent of the root system, This is for a bearing tree from four to six inches in diameter, and the time for applying the kainit is in the spring, when the trees are leafing out. Prof. Smith states that "the kainit has proved successful in our orchards, wherever used." Another method of treatment which has been recommended is to dig in tobacco waste around the roots.



Fig. 15.



Fig. 16.

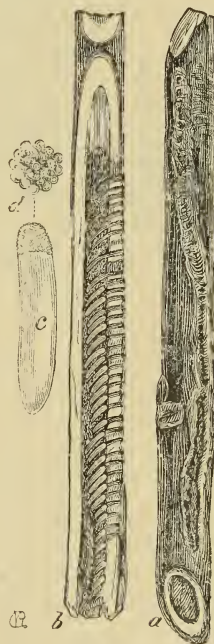


Fig. 17.

Fig. 15, male; 16, female; 17, injured canes.

Mr. Woolverton, the energetic Secretary of our sister society, the Fruit Growers' Association of Ontario, states that the Pear Leaf Blister Mite (*Phytoptus pyri*) is rapidly gaining ground in the Niagara district, the corky dark-colored galls being conspicuous on the foliage of most pear trees. On account of the diminutive size of the mite which causes these blister-like galls and from the fact that it works inside them out of sight, it is seldom recognized as the cause of the injury, many people attributing the origin of the galls to

some parasitic fungus. The treatment which has been recommended for this pest is spraying the trees with kerosene emulsion just as the buds burst in spring. On the Pacific Coast, where it is also very prevalent, good results have been obtained with a winter wash consisting of sulphur one pound, lime two pounds, salt one pound, and water three gallons. The manufacture of this wash is described in detail in an article on the San Jose Scale published in our last annual report.

The Snowy Tree-Cricket (*Ecanthus niveus*), or one of the allied species, is doing much harm in raspberry plantations about Hamilton. Several specimens of injured canes have been sent to me which had been pierced by the females when depositing their eggs. Some of these had split open down the whole length of the punctured area, and the canes in all cases were much weakened. This insect is claimed to be predaceous, and Miss Mary Murtfeldt, who I think was the first to observe this fact, says that they feed almost entirely upon Aphides and other minute pests and make ample compensation for all the injury that they do, and that they should be considered beneficial rather than injurious. Around Hamilton, however, I am told by Mr. Wm. McEvoy, of Woodburn, Ont., that the injuries to raspberry canes are serious. The only remedy which seems practicable is the pruning and burning of the injured canes early in spring before the eggs hatch, for the insect passes the winter in the egg state inside the canes. Figs. 15, 16 and 17.

The insects I have mentioned I think will include all the worst enemies which have been brought before my notice during the season as having occurred injuriously in the province. There were, of course, several others, but none requiring special mention, except, perhaps, the Carpet Beetle (*Anthrenus scrophularice*), Fig. 18, which is gradually extending its range, and the Mediterranean Flour Moth (*Ephestia Kühniella*), Fig. 19, for which a

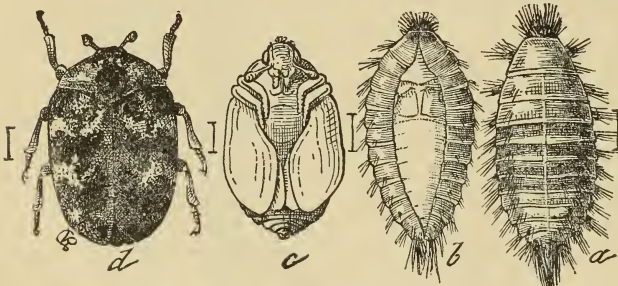


Fig. 18.

Fig. 18, a and b, larva; c, pupa; d, beetle.

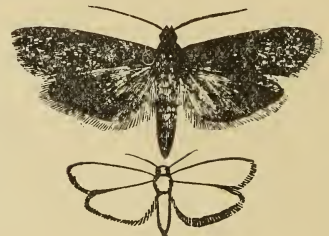


Fig. 19.

(a). Moth (imago) magnified. (b). Outline, showing natural size.

new locality has been found at Valleyfield, Que. Specimens were sent to me from a mill early in October, and instructions were promptly given as to the best steps to take to clean the mill. These were adopted, and in December I received a report from the manager that the outbreak had been suppressed. I think it probable that he may have taken too favourable a view of the matter, and I have urged upon him the necessity of keeping a constant watch for any appearance of the insect. This is not only an extremely injurious pest, but an exceedingly difficult one to eradicate. I find that it occurs more or less plentifully in some of our large milling centres, and, where special efforts are not put forth to control it, loss is sustained.

THE GROWTH OF THE WINGS OF A LUNA MOTH.

BY J. A. MOFFAT, LONDON, ONT.

In the afternoon of March 5th, 1895, I heard a noise amongst my cocoons. On examination I found that it proceeded from the cocoon of an *Actias Luna*, Fig. 20, which had been given to me early in the season. It was extremely thin; when I took it up I could see the movements of the imago through it. It was revolving as well as scratching

vigorously. It seemed to be conscious of its imprisonment, and appeared so eager to escape, it made me feel uncomfortable, so I opened a hole in the cocoon, out of which it crawled on to a finger which I extended for its convenience, thus missing an opportunity of seeing it dig its own way out. It was perfectly dry, and left no moisture on the cocoon or pupa case. I gave it a position to suspend from, where I could observe it conveniently. I looked at the time; it was a quarter to three. It did not show the slightest inclination to travel.

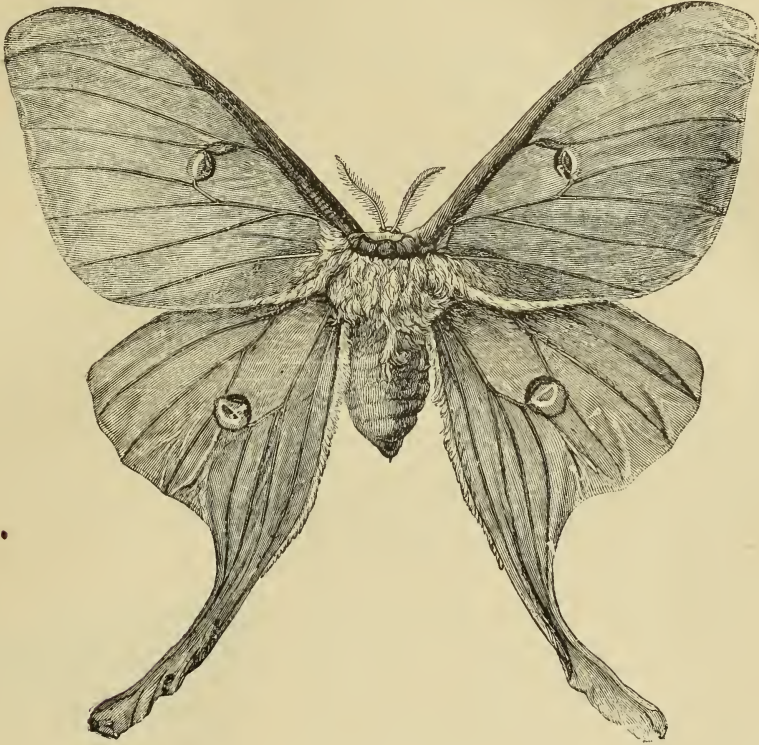


Fig. 20.

The abdomen was fully extended, green in colour with, comparatively, narrow white bands around it. The front winglets were about three-quarters of an inch in length, the hind ones less, clothed with hair-like scales, slightly tinged with yellow, sufficient to contrast with the pure white of the body covering. The tail was bent round and laid along the outer angle of the hind winglet, as shown by part *b* on Fig. 21, which gives a moderately correct representation of it on an enlarged scale. At five minutes to three a green spot appeared near the base of front winglet, gradually enlarging as the fluid spread between the membranes, and deepening in colour as the quantity increased. At three o'clock the green had reached the eye-spot on the front wing, and the maroon colour of the costal band. At 3.10 the wing was one inch and a half long. By this time the fluid was passing rapidly along the costal edge and extending, whilst the outer angle had not yet begun to extend; the result was the apex drawn back, the membrane of the wing bulged and bagged outward. At this time the hind wing had got a green tinge along the outer margin, which was extending. At 3.20 the outer angle of front wing had relaxed somewhat, which allowed the costa to straighten and reduced the bulging. 3.35—the front wing looked to be full length, but not full width. 3.45—hind wing well expanded and green coloured; part *b* on Fig. 21 had moved away slightly from part *a*.

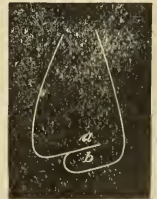


Fig. 21.

At four o'clock the space between *a* and *b* was nearly half an inch, but *b* yet retained its horizontal attitude. At 4.10 the space between them had increased, and the point of part *b* was drooping. 4.45—the tail had greatly extended, hanging crumpled and twisted. At 5.10 the moth opened its wings and walked away when I ceased taking observations. I allowed it to live over night. It was a female, not a first-class specimen. It measures four and a half inches in expanse of wing, and three and a quarter from the base of the antennæ to the end of the tail. It is heavily edged with maroon on the outer angle of front wing, and more lightly on the hind wing and outer curve of the tail. There is a row of brown dots on the veins of front wings, three-eighths of an inch from the coloured edge, which are not seen on any other native specimen in the collection. As it matured the abdomen contracted until the white bands united, and the green disappeared.

OBSERVATIONS ON THE SEASON OF 1895.

BY J. ALSTON MOFFAT, LONDON, ONT.

Hadena Arctica, Fig. 22, one of the climbing cut worms, the moth of which is seen to some extent every season, and in some seasons quite plentifully, appeared in the early part of June in extraordinary profusion, forcing itself on the attention of the most unobservant, and continued for over four weeks to be a complete nuisance to the community. It was to be seen everywhere; shop windows were rendered unsightly by their presence, dead and alive. They would enter dwellings, hiding away for the day in the folds of curtains and clothing, alarming the owners needlessly about their safety, and making themselves generally obnoxious in a hundred ways. I received inquiries concerning them from various directions, which went to prove conclusively that this state of things existed from the Niagara river on the east to the Detroit river on the west; and from the north shore of Lake Erie to the south shore of Lake Huron. How much further they extended I have not learned.

The Genus *Argynnis*, in some of its species, is to be seen more or less abundantly every season. But 1895 gave them forth in numbers both of species and specimens beyond all that I have ever seen before. During July there were five species on the wing at the same time. *Cybele*, *Aphrodite*, *Atlantis*, *Myrina*, and *Bellona*. Upon large patches of flowering weeds that were attractive to them they congregated in force, and when disturbed, they would rise in such a mass as to obscure the view beyond. It was my first experience with *Atlantis*. On the twenty-seventh of June I was in a locality where *Argynnis* was flying profusely. *Cybele* and *Aphrodite* were abundant, but there were some that seemed to be different from either, and with which I was not familiar. They were smaller in size and with a noticeable black border on the hind wings, so I captured some for comparison. All the *Atlantis* in the Society's collection are labelled "Montreal," and are quite uniform in size and markings. There were none of those I took that were quite so small, or with so much black in the border. On the first of July I secured more, and found that they varied considerably. Some of them I could not say whether they were small *Cybele* or large *Atlantis*, so to settle the doubt, I sent an example to Mr. W. H. Edwards, who promptly informed me that it was *Atlantis*. I saw them plentiful at Sarnia, and Mr. W. E. Macpherson, of Prescott, Ont., said it was the same at Windsor. On the sixth of August I received several specimens from Mr. Macpherson, taken by him at Prescott. They were much nearer to the Quebec type than the majority of those I took here; with a little additional black in the border of the hind wings, they might not be separable. I may state here as a matter of some interest that I never took at Hamilton what I consider to be typical *Aphrodite*, with the dark cinnamon-brown shade on the under surface of the hind wings, which is comparatively common about London, and easily obtained.



Fig. 22.

On the twelfth of August I had a call from Mr. Wm. Lochhead, of Napanee, Ont., on his way east from a visit to Windsor. When we were looking at a drawer of North American specimens that are labelled "Non-Canadian," his eye resting on *Argynnis Idalia*, he remarked: "There is a butterfly that was taken at Windsor." I had long desired to hear of that species being reported Canadian. I expected it to enter our territory in the east, but instead it has come to us in the west. Afterwards I received through the kindness of W. S. Cody, B.A., a Windsor specimen for the Society's native collection.

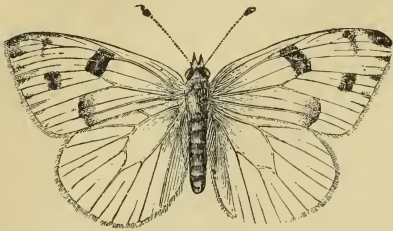


Fig. 23, Male.

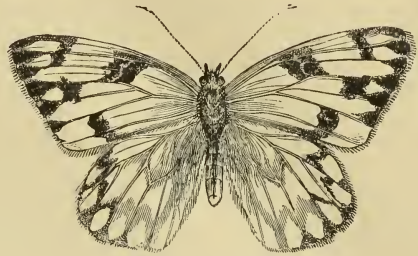


Fig. 24, Female.

Pieris protodice has been seen here in greater numbers this season than it was last. It has also been reported to me from other localities. Mr. Macpherson, who spent some weeks collecting about Windsor, Ont., called upon me when he was returning east. Whilst looking over the Society's collection, when we came to the *Pieris* he pointed to the female of *Protodice*, remarking, "There is the butterfly I saw at Windsor and didn't know what it was!" An interesting testimony to its total absence of late years, which seems so strange to those to whom it was such a familiar object in times gone by. I received a letter from W. S. Cody, B.A., of Windsor, dated July 22nd, in which he said, "*Pieris protodice* appeared for the first time here about the 4th of July, although it might have been here unnoticed before that, and soon became more common than *P. rapæ*."

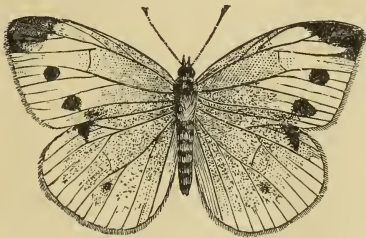


Fig. 25.

Not being familiar with it, I took nothing but females for a while, and think they must have been more common than the males at first." We can easily understand how male *protodice* might pass unnoticed when flying with *rapæ*, Fig. 25. Mr. Anderson took males only here during July; he did not even see a female. It has also been reported to me as being plentiful at Essex, Alvinston and Woodstock.

In 1895 the season for collecting commenced early, but received a check later on. Mr. Anderson reported to me some good finds at electric light before I thought it likely that anything could have been got, light proving more profitable with him than bait throughout the season. The fascinating power of light at night seems to be general over all kinds of insects, and by concentrating it at particular points makes it easy to secure quantities of them, and gives an opportunity of estimating the comparative scarcity or abundance of the various kinds better than any other method. In this way, Mr. Anderson could have taken dozens of some kinds that I thought I was doing well to get two or three of in a season in the ordinary way of collecting. Bait will not attract some, no matter how skilfully it is compounded, and it fails with all at times; but light, especially electric light, never fails to draw, if the weather is at all propitious.

In September, I sent to Prof. J. B. Smith a box containing twenty-nine specimens of Mr. Anderson's securing, which I could not identify with anything in the Society's collection. Fourteen of these proved not to be represented therein. I had sent a few Bombycids which the Professor did not care to pronounce upon in the present transitional

state of the nomenclature. There were some duplicates, different looking forms of one species, whilst others were varieties or better and more distinctly marked specimens of those already named in the collection. As a testimony to the character of Mr. Anderson's work, I quote from Prof. Smith's letter to me accompanying the list of names: "Your box of insects came duly to hand by express, and in good condition. It is by all odds the most interesting box you ever sent me, and contains the best species, as well as, I think, the best specimens I have ever had from you. * * * Your Nos. 2 and 5 (*Copipanolis cubilis*, Grote) are varieties of one thing, and, if you have others, I would very much like to have a specimen, since the species is not represented in my cabinet. No. 3 (*Feralia major*, Smith) is a very good species, recorded, I believe, for the first time from Canada in this sending. Your No. 11 (*Dicopsis Grotei*, Morr.) is a beauty, and perhaps the handsomest specimen of the species that I have ever seen. No. 10 (*Xylomyges dolosa*, Grote) is by no means common. The other species need no special reference and are noticeable only by their excellent condition."

Amongst the Bombycids that I sent to Prof. Smith was a *Gastropacha*, which he gave as "*Ferruginea*, probably." This I expected would likely be so, as it corresponded well with the original description in everything except size. Packard says, *Pro. Ent. Soc. Phil.* Vol. III., p. 386, "A smaller species than *G. Americana*." But all the specimens that I have seen of this form are decidedly larger. In the "Preliminary Revision of the Bombyces of America North of Mexico," by Neumægen and Dyar, *Ferruginea* is given as a variety of *Americana*. During the early part of May, *Americana* was abundant at light. This *Ferruginea* did not appear until the middle of June, and not so numerous, and the one had passed before the other appeared, which seems to conflict somewhat with the idea of their being forms of one species.

The other names of this lot that were new to the Society's collection are:

Acronycta hasta, Grote. Resembling *lobeliae*, but smaller and darker.

Dicopsis viridescens, Walk. A widely distributed species.

Mamestra detracta, Walk. The habitat of this species is given in Prof. Smith's List as Labrador, White Mountains, Colorado, 12,000 feet.

Xylophasia lateritia, Hubn. A European as well as American species.

Perigea luza, Grote.

Scopelosoma devia, Grote. This addition completes the list of this genus in the collection.

Morrisonia evicta, Grote.

Hyblæa puera, Cram. Prof. Smith, in his catalogue, bibliographical and synonymical, gives the habitat of this species as Texas, Florida, West Indies; and remarks, "It seems to be a common form in more tropical regions and only occasional in our own fauna."

Melipotis jucunda, Hubn. This is but the second species of the genus to be represented in the Society's collection. *Limbolaris* was frequently taken about Hamilton. I am not aware of this species being reported from Canada before. The other species of this genus are all given as from the south and west.

I afterward sent a box of Bombycids to Mr. Harrison G. Dyar, who kindly determined them for me. Those of them that were new to the Society's collection of Mr. Anderson's captures are:

Lophodonta georgica, H. S.

Schizura leptinoides, Grote.

Ianassa lignicolor, Walk.

Cerura scolopendrina, Bdv. Upon this species Mr. Dyar remarks, "The specimen is of the form *Modesta*, Hud., the band broken as in *Albicoma*, Strecker." These names are varieties of *Scolopendrina*.

Mr. Anderson also secured two specimens of *Dilophonota ello*, Linn, in splendid condition; and a pair of *Protoparce cingulata*, Fab., with the pink ornamentation beautifully bright and fresh.



Fig. 26.

A rare and interesting capture by Mr. Anderson in the early part of October was a specimen of *Pyrgus tessellata*, Scudder, Fig. 26, fresh and in fine condition. It was in company with another, which he did not secure. This attractive butterfly has been reported once before from Ontario, taken by Mr. Lowe, in Essex County, and given under the synonym of *Hesperia oileus*, Humph.-West, June, 1875.

VARIATION, WITH SPECIAL REFERENCE TO INSECTS

By J. ALSTON MOFFAT, London, Ont.

“No compound of this earthly ball
Is like another, all in all.”—TENNYSON.

Variation amongst forms of life is one of the most interesting and evident truths in nature. The causes at work producing it are receiving a marked degree of attention at the present time, but not more than the importance of the subject deserves. No one has given thought and attention to its manifestation amongst living forms without being subjected to difficulty and perplexity by it. It lies right across the path of the investigator of the laws of life, and is the stumbling-block of the systematist. It cannot be ignored or thrown aside, but must be admitted, and a place given to it in every system in nature that is constructed.

The causes of variation in forms of life are many. Some of them are simple, apparent and easily comprehended. Others are obscure and difficult to trace. As a considerable diversity of opinion exists as to the source of its origin in nature, and the present state of our knowledge does not satisfactorily explain all that we see associated with it, therefore, an orderly statement in plain language of what is known on the subject may not prove objectionable to those who have got into perplexity and wish to investigate the subject for themselves.

All nature—that is, everything that comes within the range of physical investigation—is controlled by unchanging law. Each portion of it has a law or laws of its own, which we call the laws of its nature. We do not see these laws; we know of their existence only by observing the uniformity of their manifestations. For instance, given the same materials in the same proportions and in the same conditions, and the same results will follow every time. Change one of these by ever so little, and a different result will certainly be produced. Thus we have the ever-changing manifestations of nature from unchanging laws, through the ever-changing conditions and combinations of the same materials. Life is as completely under the control of law as matter, but it is infinitely more complex and difficult to trace.

Matter has been divided into the organic and inorganic. The inorganic surface of the globe is the foundation on which rest the organic forms thereof, and from which they may be said to have come, as all the materials for their solid structures and sustenance are derived therefrom. The face of this globe has been frequently changed. There was a time when life could not exist upon it. When the conditions became favorable, organisms appeared suitable for the conditions—low in the scale of life, but neither defective nor degraded. That forms of life varied with the varying conditions of the earth's surface, is conclusively demonstrated by the geological record, and that the organisms of the various geological periods were as thoroughly in harmony with the conditions in which they lived as are those of the present. That many of the forms of life in the present are the lineal descendants of some of those of previous geological periods is extremely probable, if not positively certain, but so changed in appearance by altered conditions as not to be now recognizable.

No doubt many forms of life came and went before insects appeared. These are comparatively highly organized forms of life, the higher appearing later in point of time, life keeping pace with its surroundings, and so maintaining harmony. The conditions are not uniform over all the earth's surface at the present time, and we know that the appearance of the life of the various portions of the globe differs in many instances to such an extent that an expert can tell from what part of the world a particular form came by its appearance; and thus we learn that variation in living forms is not a thing of recent origin.

Our knowledge of the extent to which variation may go is largely obtained from man's efforts to change for his own advantage those kinds which he thought were going to prove conducive to his welfare or gratifying to his fancy. But man's methods in bringing it about are not identical with nature's. Although they must be in harmony with the laws of nature for profitable results, yet illustrations taken from one and applied to the other may be very misleading.

Wallace, in his "Island Life," page 55, says: "Few persons consider how largely and universally all animals are varying. We know, however, that in every generation, if we could examine all the individuals of any common species, we should find considerable differences, not only in size and colour, but in the form and proportions of all the parts and organs of the body. In our domesticated animals we know this to be the case, and it is by means of the continual selection of such slight varieties to breed from that all our extremely different domestic breeds have been produced. Think of the difference in every limb and every bone and muscle, and probably in every part, internal and external, of the whole body between a greyhound and a bull-dog! Yet if we had the whole series of ancestors of these two breeds before us, we should probably find that in no one generation was there a greater difference than now occurs in the same breed, or sometimes even the same litter. It is often thought, however, that wild species do not vary sufficiently to bring about any such change as this in the same time; and though naturalists are well aware that this is a mistake, it is only recently that they are able to adduce positive proof of their opinions."

In this extract we get great truths clearly stated, with a misleading inference appended. No divergence has ever appeared in the dog family in nature at all comparable to that between a greyhound and a bull-dog, and I have no hesitation in saying never would, no matter what length of time was given, and so long as the dog remained in a state of nature, we might add never could, and the reason is simple and obvious. All man's domestic animals came originally from wild forms; all the possibilities that man has disclosed were latent therein. Under domestication they became apparent, then by selection, elimination and rejection, man led one strain in this direction and another in that, concentrating and exaggerating these points of difference until the present results have been reached. Now, selection in nature is of the most indiscriminate character possible. There is a constant commingling of the slightly divergent forms going on that never gives any peculiarity an opportunity to concentrate and disclose itself very conspicuously, and if it did in one instance it would be reduced or even obliterated, to all appearance, in the next generation. And it is this sort of selection that produces and maintains that marked degree of general uniformity which we see does prevail amongst living forms in a state of nature. Thus we learn how widely divergent is the result of selection in nature from selection by man for his own benefit, the one tending to reduce variation to a minimum, the other to carry it onward to its maximum.

The most powerful influence for the producing of variation in life in nature, is to be found in external conditions. A power inherent in a locality, capable of modifying the appearance of an organism residing therein, combined with the susceptibility in varying degrees of the organism to receive, retain and transmit the impressions. That living forms are changed in appearance by residence in different parts of the globe is a fact not requiring to be proved in the present day. It has forced itself upon the attention of all observing travellers, and the books of such travellers as Darwin and Wallace are full of examples of it; and as the attention of those engaged in the investigation of nature is

being more than ever turned in this direction, illustrations confirmatory of it are being multiplied. In his later writings, Darwin acknowledged that he might not have assigned to it all the importance that it deserves, or the consideration to which it is entitled, and as investigation progresses, its influence in producing variation in nature is becoming more generally admitted. In tropical countries, where life is under a kind of forcing process, this power is strikingly exemplified in insects. There we find variation showing itself in the changed appearance of the same kinds of insects, within shorter distances and in greater numbers. Wallace tells us of one form of butterfly that he traced from the seashore inland until it was scarcely recognizable as the same species, so greatly did it change. This is an exceptional case, but the influence is present, if only the organism is sensitive enough to take the impression. Then consider, that a similar influence is at work to some extent, in some direction, on every form of insect life in the world, and we may form some conception of the tremendous power at work producing variation; for it is a fact well established by observation of life in domestication, that when a change has been brought about in an organism, it is easier afterwards to produce more and greater. But more; the same laws that are in operation at present, producing such results, have been at work ever since insects had an existence. Through all the various geological periods in which they have lived, this moulding and modifying influence has been going on, so it is not very surprising that the liability to vary should be so well established in their constitution now.

Because such a power exists in nature, we have no authority for supposing that it may go on indefinitely, and produce not only different looking things of the same kinds, but also different kinds. That would be contrary to the laws of nature as we know them, also to observation and experience. Each sphere of influence is well defined, whether we can trace it or not. It has a centre where it will be most powerful, and a circumference where it may be more weak, but if a change is to be brought about in the organism, a change must be made in its habitat, or it must be made to change its habitat. What difference would be produced by the change would have to be discovered by observation, if the organism survived it, for it is well known that conditions not necessarily fatal to life in themselves, might become so if brought about suddenly. Organisms do not change themselves by an effort of the will; this influence is external to themselves, and modifies them quite unconsciously to themselves.

What these influences are, or how they operate in producing a change in organisms, is at present but little known. Past observations point to chemical agency as a powerful factor. Indeed, in one view of it, the surface of the sphere on which we live is one huge chemical laboratory. The process of disintegrating matter and re-compounding it is perpetually going on. Then the various organisms are composed of multitudes of cells that are endowed with the power of choosing and absorbing from inorganic substances the materials required for their own special wants, and passing them on to other cells to be transmuted into the proper ingredients for the producing and sustaining of every organ in each and all, even the most complicated and highly organized beings on the earth. In the case of insects, heat and cold, moisture or its absence, light and obscurity have been shown to have an influence in changing their size and colour, the result, no doubt, of chemical combinations and actions. We see frequent instances of the same conditions producing opposite effects in different organisms, attributable to the inherent power of cells for differently combining the same materials or transmuting them chemically. And now that the conclusion has at length been reached, confirmed by correct scientific investigation, and one which harmonizes so well with all our observations and experiences, that heat does not come to us through space, but is chemically produced within our atmosphere in some way by means of the sun's rays, which are electrical, we seem to have got in some measure an explanation of how geologic and climatic influences obtain their power to modify organisms.


Although external influences are the most powerful originating cause of variation in living forms in nature, the most obvious one, and the one that attracts the most attention, is brought about by the intermingling of existing varieties, which tends to produce yet more abundant variation. The parents being unlike, we see some of the offspring

taking after one parent, some after the other, some with a curious admixture of both ; whilst others have no special resemblance to either. One does not require to travel in order to obtain abundant evidence of this.

In following out this part of my subject, I shall have occasion frequently to use the term *species*, so it will be well first to define the sense in which I use it. I remark, then, that I accept without reservation Worcester's definition of the term, which he states thus :

"1. Appearance to the senses or the mind ; sensible or intellectual representation.

2. An assemblage of individuals allied by common characters, and subordinate to a genus or sub-genus ; a group.

 In zoology and botany *species* is founded on identity of form and structure, both external and internal. The principal characteristic of *species*, in animals and vegetables, is the power to produce beings like themselves, who are also productive."

Here we have the term as used in connection with non-living matter used in classification, and as specially applied to living matter. In non-living matter, such as soils, rocks and inorganic substances generally, *species* are separated by appearances as they present themselves to the eye or mind. They are tested by the senses, when found to be different, they are pronounced to be specifically distinct. There are no differences of opinion as to their right to be called *species* ; and the reason of it is, that they are inert and passive under external conditions. Specimens of the same species may be separated by thousands of miles, and that for thousands of years and no perceptible change has taken place in them. But living matter is constantly changing ; from less to greater ; from young to old ; from vigour to decay ; from one generation to another, all passing on to death and dissolution. What a gulf separates these two kinds of matter ! or, if you will, the same matter under such different conditions. Now it is not in harmony with what is considered to be exact scientific phraseology, to apply the same term in the same way to two such differently constituted subjects of investigation ; and separate *species* in living forms on exactly the same lines as in non-living matter. Taking "appearance to the senses" as the only guide to a definite conclusion ; and yet that is what has been, and is yet being done by numbers of systematists and the result is, confusion and uncertainty.

Take as an illustration of how this method works in practice, the oft-quoted instance given in Darwin's "Origin of Species," p. 37. "Mr. Balington gives two hundred and fifty-one species to a given genus. Whereas Mr. Bentham gives only one hundred and twelve. A difference of one hundred and thirty-nine doubtful forms." Both are supposed to be competent authorities, why this vast difference in the result of an investigation of the same material ? The answer to the question is to be found in the method of conducting it. Mr. Balington probably had a keen eye for detecting things that differ. He surveyed his material and separated it according to appearances, and when he was done he found that he had two hundred and fifty-one forms in which perceptible differences presented themselves to his mind, and he called them *species*.

Mr. Bentham was probably more critical. He might take into account the fact that living forms were always liable to vary more or less, and he would see that some of these forms so imperceptibly merged into one another, that he suspected that they were not entitled to be called *species*, so he united some here, and some there along the line, making their differences more perceptible whilst he reduced their numbers to one hundred and twelve, according to his estimate of what constituted a *species*.

Now that is exactly what might happen with any two investigators of a genus, with numerous so-called species upon this continent, who separated their *species* by perceptible differences. And that is probably what did occur in the genus that originated the "Colias Controversy," or the one that has started the Argynnis contention. Darwin himself worked on the same lines, and he has told in his own vigorous language what trouble he got into through it. He says : "After describing a set of forms as "distinct species, tearing up my manuscript and making them one "species, tearing that up and making them separate, and then "making them one again—as has often occurred to me—I have "gnashed my teeth, cursed species, and asked what sin I had committed to be so

punished?" and such is the natural result of an effort to attain to certainty, by means of an uncertain method; and no amount of investigation upon the same lines, by ever so competent an authority, can ever be unmistakably certain. The only conclusive verdict must be obtained by an appeal to nature; unite the differing forms, and if they have "the power to produce beings like themselves who are also productive," then the species is one, and the different forms are portions of it. This is the law of nature controlling all bi-sexual life, and it is extremely doubtful if there has ever been a well authenticated instance of its violation. Cases have been reported of so-called different species having been united, and the product carried forward for several generations, but that simply proves that the term *species* had been wrongly applied; and this wrong application of the term by namers and describers of species is traceable to the method of making species exclusively from perceptible differences. To illustrate the danger to which such are exposed in following that method, I quote the following passage from Wallace's *Island Life*, pp. 55 and 56. "An American naturalist, Mr. J. A. Allen, has made elaborate observations and measurements of the birds of the United States, and he finds a wonderful and altogether unsuspected amount of variation between individuals of the same species. They differ in the general tint, and in the markings and distribution of the colours; in size and proportions; in the length of the wings, tail, bill and feet; in the length of particular feathers, altering the shape of the wing or tail; in the length of the tarsi and of the separate toes; and in the length, width, thickness and curvature of the bill. These variations are very considerable, often reaching to one-sixth or one-seventh of the average dimensions and sometimes more."

We see in this extract, the perplexity that must necessarily arise in the mind of those engaged in studying such variable forms from their point of view, as to how far this sort of thing may go before it becomes a different species. Now, man has demonstrated most conclusively in connection with his domestic animals, that no amount of that kind of variation interferes in the slightest with the various forms uniting, "and producing beings like themselves, who are also productive." And the same laws are operating upon life in nature in the same way. *Species*, is a question of lineage; not of size, form or colours. These are incidental.

Having given the manner in which I use the term *species*, I continue the subject of variation.

We have seen that there are a combination of influences at work in every habitable portion of the globe, producing a change in the appearance of the life of each, in proportion to the susceptibility of the species to receive the impression. That such spheres of influence have a centre and a circumference, well defined although to us unperceived, except by the effect produced. Long residence in a locality for many generations giving the influence of that locality an opportunity to exert its utmost on the species living under it, whilst propagations with the local stock will tend to produce a more distinctive form of a species, acting as in-and-in breeding does in domestication. A fact well illustrated by the life of Islands, which is as a rule more uniform in appearance than that of continents with their extended areas.

Now it is an acknowledged fact that insects are notorious for spreading; either from their innate desire to migrate, or by external assistance. So the particular forms of one locality are constantly getting mixed with the different forms of the same species in another locality; uniting with them, "and producing beings like themselves who are also productive." It is a well-known experience of breeders in domestication, that when differing strains of the same species are united, a great uncertainty exists as to what the appearance of the offspring will be; and the greater the difference is, the uncertainty becomes proportionately greater. But more, we have to take into consideration not only the late ancestors which we may have seen, but remote ancestry which we could not see, that may have had in them strains that we never suspected, until they showed themselves in those we see.

Now this commingling of different forms of the same species is constantly going on all over the habitable globe, and given time and opportunity a species, or its descendants, could encircle the earth and produce confusion amongst the typical forms of every locality.

And when we consider that the forms of each locality are thus pushing their way outward, to mingle with those of other localities, we have an abundant source of supply for unlimited variations from the well marked and easily defined forms of any species, to the most minute shades of differences that are well calculated to drive the makers of "Species by perceptible differences" to the verge of distraction.

Let us now throw the reins to imagination, and urge it on to its utmost capacity, for it can never exceed the truth in this direction, and conceive if you can the multiplied diversity of external influences that insects have been subjected to since they were first originated up to the present time. Think of the differences of the environments they may have lived in for a greater or less extended period, and that each and all were perfectly adapted to their times and conditions, harmonizing with and fitting into them as naturally and unconsciously as water fits into a vessel. That the surface of the globe has always been diversified in climate; that insects were as susceptible to external influences, as much given to migrating and mingling together the diverse forms of the same species, and thus multiplying diversity as now; and that this and a great deal more has gone on through all the geological eras and ages that have intervened between their first appearance and the present, there seems but little cause left for wonder that *species* should be difficult to define by perceptible differences. But lest the surprise should take the opposite direction, and the wonder be that classification is possible, remember that this has all gone on under the control of unchanging laws—the laws of life and heredity, with their marvellous power of colour and form, producing beauty and attractiveness; the laws of matter and force, those that make for change and those that tend to stability; chemical affinities and combinations; brought about through light, cold, heat, and electricity; change without haste, yet without cessation; almost imperceptible, but unmistakably accomplishing results; like some huge, complicated, perfectly adjusted, self regulating machine, so absolutely perfect in its operations that it has never needed alteration or repair since it was first set in motion. Or as the fabled mills of the gods that ground very slowly but very fine, whilst the outcome of the process is what we see. Here we have "descent with modification" throughout the ages, but the same species still, if in the direct line of descent.

In such plain and evident facts of nature we seem to get sufficiently powerful and persistent causes to bring about the superabundant diversity that characterizes insect life without entering upon those that are obscure and doubtful.

The period of existence when insects are most susceptible to external influences are in the egg, larval and pupal stages. It is in these that the impressions are received which afterwards show themselves in the changed appearance of the imago. When a change has been produced in the appearance of the mature insect, a change may reasonably be expected in its early stages. Therefore when different localities are possessed of influences that are capable of making themselves manifest in the different appearance of their mature forms, and the early stages of these forms partake of a corresponding difference, and they breed true to their particular forms through all their stages, it proves nothing whatever as to their specific standing. This for conclusive settlement will require the extremes of the mature forms to be brought together, united, and see if they will produce beings like themselves, who are also productive. If so, then the species is one, regardless of their differences.

My subject would seem naturally to end here, but there are views held by some that are not in harmony with those stated, which will suggest objections that can be anticipated and may be replied to here without departing from its general scope and purpose.

Some will be ready to say, if the species is one the name should be one also. I reply, that a single description can never cover a multiform species. A constantly recurring form that requires a separate description to make it recognizable, should have a separate name. This might have the effect of reducing the number of species and increasing the number of names. Mr. W. H. Edwards has somewhere said (I quote from memory and may not be exact): "We have no such a butterfly as *Ajax*. We have *Walshii*, *Abbotii*, *Telamonides* and *Marcellus*. These four forms constitute *Ajax*." Here it requires four descriptions and four names to correctly distinguish one species. Mr. Edwards applies

that principle throughout his check list to all seasonally polymorphic butterflies. Let the same principle be followed in dealing with all sorts of variations, amongst all kinds of insects, and worked out in their classification, so far as is known, and what an amount of exact information could be conveyed at a glance as to the relationship of the different parts of any multiform species. We would have the different forms that are to be found in separated localities in the same country distinguished by name, and the forms of the same species found in other countries, continents or islands, with distinguishing names, whilst their habitat might be indicated as well. We should have also the kind of varieties, whether permanent local forms or incidental variations on these, brought about by the intermingling of separate forms, varieties wholly the result of natural operations, or produced by man's interference with the course of nature in pursuit of his own ends, and thus including the most recent variations; giving an opportunity to indicate forms that may have been exterminated through altered conditions, varieties seasonal, sexual or unaccountable, thus giving a world-wide view of every variable species according to the extent of knowledge procurable up to date, laying a solid and certain foundation for future advances in the same direction. It would be an immense convenience if *species* could be defined by appearance with certainty, but past experience has, so far, proved it hopeless. An approximation to the facts is the most that can be looked for. Ova, larvæ, and pupæ can all be classified by appearances as well as imagoes, but a system reared upon preparatory stages would fail of certainty as sure as on the mature one. No regularly graduated line can be formed of either, some inconvenient breaks are found in all. Some forms are found that will not fit in comfortably anywhere, whilst affinities are found in others that point in opposite directions. Yet for final arrangement and classification surely it is upon the affinities and resemblances of the mature form it ought to be founded, all the others being but preparatory thereto. So I conclude that the limit of *species* is found by uniting two, when the beings produced are uniformly non-productive, but the limit of variation cannot be reached until the power to produce different conditions and combinations has been exhausted.

SOME WINTER INSECTS FROM SWAMP MOSS.

BY W. HAGUE HARRINGTON, F.R.S.C., OTTAWA.

Where are the insects in winter? What becomes of all the varied winged and painted forms that in the hot summer hours fill the air with movement and sound? Then every nook and corner of the land has its tiny familiar folk, flitting from flower to flower, in restless haste; every plant has its devouring hosts, and crawling, running, leaping creatures swarm in every direction. With the shortening days and the approach of frost, the myriads of insects, which have added so much to the joyous, exuberant life of summer, fast disappear and silence broods through forest glades and over meadow vales, which rang continuously with the shrill murmurings and stridulations of the innumerable orchestra. A few drowsy flies crawling on a sunny surface, or an occasional butterfly flitting in the midday warmth, may occur until winter has well set in, but these at last disappear. The winds strip off the dead foliage, the frost congeals the surface of the ground, and snow covers, beneath its chill pure shroud, a land from which all life seems to have departed. "All the insects are dead" the thoughtless remark, forgetting for the moment that they will be as numerous and lively in the forthcoming summer, and that none of the immense variety of forms will be created afresh.

Certainly the vast majority of the individuals, which are seen during the warmer season, perish before the close of the season, for the life of most insects is but a brief span, but the perpetuity of the species is preserved in spite of the apparent death of all the individuals. In some secure hiding places, then, the representatives of each species must remain during the long months of frost and snow. Those who have not made a study of our smaller forms of life would find it difficult to search out any of the swarms which are waiting for the vivifying breath of spring. Some might remember that our houseflies have crawled away into cracks and crevices, from which to sluggishly emerge

when it becomes warmer, but probably this would be the measure of their knowledge of the winter life of our insects. The entomologist, (concise term for the student of insect life,) however, who seeks to make himself acquainted with the complete life-history of each species, has as an essential part of his task to discover how the winter is passed. Naturally he finds that there is much diversity of habit, and that it may be either as egg, larva, pupa or imago, (adult or fully developed form) that the long cold months are safely tided over and the unbroken succession of the species preserved.

Many of our forms find security in the bottoms of the streams and pools, protected by the shield of ice which has been formed above them. Others are safely buried in the ground, beyond the reach of frost, or hidden in their burrows in our forest trees, but a great proportion are incapable of attaining such a degree of protection, and have to be content to hide in some crevice or similar shelter, or to depend upon such covering as they may be able to construct. It might well be supposed that those non-aquatic insects which hibernate in the perfect state would seek out some nice dry cranny in which, if possible, to shelter themselves from both cold and wet. Surprise may therefore reasonably be excited when it is discovered that a considerable degree of moisture seems in no degree harmful even to many species of a most delicate and fragile organization. The saturated frozen mosses of the swamps might appear the very opposite of suitable winter-quarters, and yet they very frequently contain an amazing number and variety of insects.

Having at several times gathered quantities of such mosses in the early winter, and obtained from them many interesting specimens, it has occurred to me that a brief summary of the result of my last foray of this sort might be of some interest to those who are curious as to the winter existence of our insects. I hope, too, that the list which I shall furnish may be of some little value to our many students in this branch of natural history, and may perhaps give some new light as to the habits of some of the species. For in all of our investigations we must bear in mind that, without a complete knowledge of the full yearly round of the existence of each species, we may perhaps lack just what it is most essential to know.

At the present time great attention is given to what is called economic entomology, which merely means the application to the benefit of the community at large of the knowledge which is slowly and laboriously gathered by many students, working generally merely for their own love of investigation, and often at considerable expense and self-sacrifice. At the Central Experimental Farm, at Ottawa, Canada has employed a very capable and indefatigable entomologist whose investigations and reports cannot but convey much needed information to the agricultural population. But the capacity of any man to make investigations is limited by the time at his command, and he is therefore compelled to avail himself of the labours of others, and as there is no one, especially if resident in the country and engaged in agricultural pursuits, who has not opportunity for observing the habits of some of our insects, there should be many who could render some aid to our excellent Government Entomologist, Mr. Fletcher, by communicating to him the observations that have been made. In devising methods for the destroyal and control of those insects which are classed as injurious (either to plant or animal life) it may become important to ascertain how they survive the winter, so as to know at what season they may be most easily and cheaply combated.

Before proceeding with my list of species I will summarize for my non-entomological readers the method employed in collecting the specimens. The best localities for gathering the moss are to be found in swamps, surrounded and interspersed with trees and shrubs, and offering to the botanist in summer a considerable variety of plants. The ordinary sphagnum moss which may be found in some places is too wet to contain many insects, but the mosses which occur in abundance in somewhat drier localities will generally well repay investigation. It is profitable also to collect those which grow around the roots of trees, upon fallen logs, and upon the little knolls and hummocks of the swamps. The mosses, of course, will be mixed, more or less, with grasses, fallen twigs and leaves and various foreign matters, but the presence of these is not a source of any inconvenience in examining the material collected. A sackful gathered in the nearest swamp will furnish interesting occupation for many subsequent hours, and its contents

can be examined as opportunity offers. A damp, cool cellar is the best place to keep it until such opportunities occur. For the examination of the moss, take a shallow box, several inches square and about three deep, and replace the bottom by fine wire netting of about eight holes to the linear inch. Placing this box upon a sheet of white paper, a handful of moss is torn to pieces in it, and the insects which may be present will fall through the netting. Before emptying the debris out of the box give the latter a sharp tap to dislodge any that may be "playing possum" or clinging to the wire. The insects which are now seen scampering off at different rates of speed may be picked up with a fine forceps or the moistened tip of a camel's hair pencil, and dropped in a small phial of alcohol or a cyanide bottle. It is well, if possible, to do this work in an uncarpeted room, or one in which a few spiders and other forms which will surely escape, may not create any disturbance. Spiders especially display great alacrity in making themselves scarce, and there are many beetles that are most agile in their movements, and even if picked up in the forceps will wriggle out and dart off in a new direction, always aiming, however, for the farthest edge of the table.

By adding the species collected in previous years my lists could be lengthened but I intend to confine them to the results obtained from the gathering of one season. The material examined consisted of about a peck collected on 17th Nov., about the margins of a little swampy inlet below the aboretum of the Experimental Farm, and the contents of an ordinary grain-sack filled, six days later, in Dow's swamp, (a regular cedar and tamarac marsh) upon the opposite side of the canal. At the latter date the surface of the ground was frozen and some snow had fallen, so that the moss was partially frozen and mixed with snow, making the bag pretty heavy for portaging, and I remember that, when I boarded an electric car with my burden, it provoked general curiosity (which remained unsatisfied) on the part of my fellow passengers. I have separate records of the insects from each place, but as the dates and localities were so near together I shall give but one list of the coleoptera, hemiptera and hymenoptera with the joint number of individuals of each species, to show their relative abundance.

The total number of species enumerated is 147; of which 52 occurred in both localities, 59 in Dow's swamp only and 36 at the Experimental Farm only. The number of individuals mounted and examined was 1,345, of which 889 were from the swamp and 456 from the Farm. These figures do not represent all the insects yielded by the moss, for of several of the commoner species no attempt was made to save all the examples, while some individuals escaped in spite of all attempts to capture them. In addition there were numerous individuals belonging to some of the other orders of insects, such as flies, thrips, and spring-tails, of which there were several varieties always leaping around. There were also many allied forms, such as mites, spiders, chelifers and myriapods. Among the many larvæ of various kinds may be noticed especially one which was not infrequent, and which afforded apparently a striking instance of protective mimicry. This was the larva of some fly, in which the segments of the body were so shaped and ornamented as to give the creature, which was of a bright green colour, an exact resemblance to a fragment of the moss.

The several varieties of moss contained in this gathering formed in themselves an interesting subject for examination, and in addition to the various forms of life already noted there were many examples of several of our smaller molluscs. Of these there were probably more than a dozen species, and they were preserved and handed over to one of my conchological friends to add to his collections and records. The examination of the moss was not concluded for several weeks, and it was found that its occupants remained alive and active so long as it was not allowed to become too dry, or was not exposed to excessive cold. Many of the insects proved most interesting and several had not previously been found by me. I regret that about one-third of the species have not yet been satisfactorily named, which indicates that the knowledge of our insects is yet very imperfect, and that more students are needed in the entomological field.

COLEOPTERA.

CARABIDÆ.	
<i>Bembidium variegatum Say</i>	2
<i>sulcatum Lec.</i>	6
<i>Pterostichus femoralis Kirby</i>	12
<i>Platynus picipennis Kirby</i>	2
<i>Lachnocrepis parallelus Say</i>	1
<i>Oodes fluvialis Lec</i>	1
<i>Tachycellus nigrinus Dej</i>	3
DYTISCIDÆ.	
<i>Ilybius ignarus Lec?</i>	1
<i>Ilybiosoma bifarius Kirby</i>	1
<i>Agabus sp.</i>	1
HYDROPHILIDÆ.	
<i>Hydrochus subcupreus Rand</i>	3
<i>Hydræna pennsylvanica Kies</i>	6
<i>Philhydrus perplexus Lec</i>	2
<i>sp.</i>	2
<i>Hydrocombis lacustris Lec</i>	8
<i>Hydrobius feminalis Lec</i>	8
<i>fuscipes Linn</i>	1
<i>subcupreus Say</i>	6
<i>Ceryon sp.</i>	2
<i>Cryptopleurum vagans Lec.</i>	14
SILPHIDÆ.	
<i>Colon sp.</i>	4
<i>sp.</i>	1
<i>Clambus puberulus Lec</i>	1
SCYDMENIDÆ.	
<i>Scydmanus fossiger Lec.</i>	40
<i>sp. (small)</i>	27
PSELAPHIDÆ.	
<i>Ctenistes piceus Lec.</i>	6
<i>Pselaphus erichsonii Lec</i>	15
<i>Tychus longipalpus Lec.</i>	1
<i>Decarthron abnorme Lec.</i>	3
<i>Ratrisus globosus Lec.</i>	1
<i>Bryaxis conjuncta Lec.</i>	68
<i>rubicunda Aubé</i>	9
<i>propinqua Lec.</i>	128
<i>Trimium sp.</i>	1
STAPHYLINIDÆ.	
<i>Falagria bilobata Say</i>	6
<i>dissecta Er.?</i>	1
<i>Aleochara nitida Grav.</i>	4
<i>sp.</i>	1
<i>? sp.</i>	1
<i>Dinopsis americanus Kraatz</i>	1
<i>Acylophorus pratensis Lec.</i>	2
<i>Philonthus lomatus Erich.</i>	4
<i>nigritulus Grav.</i>	7
<i>decipiens Horn</i>	2
<i>Diochus schaumii Kraatz</i>	16
<i>Stenus femoratus Say?</i>	28
<i>erythropus Melsb.</i>	2
<i>pusio Casey</i>	4
<i>caniculatus Gyll.</i>	9
<i>croceatus Casey</i>	2
<i>Euæsthetus americanus Er</i>	3
<i>Lathrobium punctulatum Lec.</i>	1
<i>bicolor Lec.</i>	1
<i>concolor Lec.</i>	2
<i>simplex Lec.</i>	2
<i>sp.</i>	1
<i>Stilicis dentatus Say.</i>	6
<i>Lithocharis sp</i>	8
<i>Sunius binotatus Say</i>	1
<i>brevipennis Aust.</i>	2
<i>Tachyporus jocosus Say</i>	1

STAPHYLINIDÆ—Continued.	
<i>Tachyporus brunneus Fab</i>	12
<i>Conosoma sp.</i>	2
<i>Boletobius sp.</i>	1
<i>Mycetoporus americanus Er</i>	5
<i>Olisthærus substriatus Gyll.</i>	1
<i>? sp.</i>	1
<i>? sp.</i>	44
<i>? sp.</i>	14
<i>? sp.</i>	5
TRICHOPTERYGIDÆ.	
<i>Trichopteryx sp.</i>	116
<i>sp.</i>	6
SCAPHIDIIDÆ.	
<i>Scaphisoma convexum Say?</i>	2
CORYLOPHIDÆ.	
<i>Artholips marginicollis Lec.</i>	23
COCCINELLIDÆ.	
<i>Hippodamia 13-punctata Linn.</i>	1
CUCUJIDÆ.	
<i>Læmophlæus convexulus Lec</i>	1
CRYPTOPHAGIDÆ.	
<i>Atomaria ephippiata Zimm</i>	45
<i>sp. (brown)</i>	33
<i>sp. (black)</i>	1
<i>sp. (small red)</i>	24
<i>? sp.</i>	3
NIPTULIDÆ.	
<i>Omosita colon Linn.</i>	2
<i>Ips fasciatus Oliv.</i>	4
LATRIDIDÆ.	
<i>Stephostethus liratus Lec</i>	1
<i>Corticaria pumila Lec</i>	53
<i>cavicollis Mann.</i>	3
BYRRHIDÆ.	
<i>Cytilus sericeus Fab.</i>	2
DASYLLIDÆ.	
<i>Cyphon variabilis Thunb.</i>	3
THROSCIDÆ.	
<i>Throscus alienus Bonv.</i>	1
BUPRESTIDÆ.	
<i>Taphrocerus gracilis Say.</i>	1
CHRYSOMELIDÆ.	
<i>Donacia Kirbyi Lac.</i>	1
<i>Chætocnema subcylindrica Lec</i>	5
<i>Odontota nervosa Pang.</i>	2
OTIORHYNCHIDÆ.	
<i>Otiorhynchus ovatus Linn.</i>	2
CURCULIONIDÆ.	
<i>Apion sp.</i>	1
<i>Phytonomus nigrirostris Fab.</i>	35
<i>Listronotus sp</i>	1
<i>Macrops sp</i>	3
<i>Tanysphyrus lemne Fab.</i>	1
<i>Acalyptus carpini Hbst</i>	1
<i>Pelenomus squamosus Lec</i>	2
<i>Cœliodius nebulosus Lec.</i>	1
<i>? sp.</i>	2

NOTES ON THE COLEOPTERA.

Two-thirds of all the species belonged to the Coleoptera, or insects in which the hind pair of wings, when present, are the organs of flight, and are protected by the thickened front pair, known as elytra. A large proportion of our beetles are ground-dwellers, roving about through the herbage and moss, or hiding under stones and rubbish, and these are best represented. Many of these are predaceous; the remainder feeding chiefly upon decaying animal or vegetable matter, and comparatively few attacking living plants. In the above list twenty-two families are represented by 103 species, of which forty occurred in both gatherings, while twenty-seven were peculiar to the Farm and thirty six to the swamp. The former locality furnished 383 individuals and the latter 594, so that, with the beetles that escaped or were not preserved, there were considerably over 1,000 examples in these mosses, which certainly shows that they were pretty thickly distributed throughout the swamps.

Of the seven species of Carabidæ, *Oodes fluvialis* was a new record for Ottawa, while *Lachnocrepis parallelus* is also an uncommon species here. These beetles were found under the thick covering of a prostrate log, and were in shallow cells in the earthy matter on which the moss grew, evidently prepared to abide the winter there, as is done by other members of this family. The Dytiscidæ and Hydrophilidæ are aquatic or sub-aquatic beetles, although many of the smaller species live largely in decaying vegetable matter. The Pselaphidæ, a family well represented both in species and individuals, contains very small forms, which are stated to feed upon animal substances, and probably subsist in part upon other small inhabitants of the moss. *Bryaxis propinqua* and *B. conjuncta* are remarkably abundant, especially in Dow's swamp. Nearly one-third of all the species of Coleoptera belong to the Staphylinidæ, a very extensive family which I have not found time properly to study and of which there are many unnamed species in my cabinets, even of the commoner forms. These beetles are slender, depressed, elongated insects, with short elytra, remarkably quick and erratic in their movements, and living chiefly on decomposing animal or vegetable matter. The genus *Aleochara* contains, however, true parasitic species.

Of all our beetles the smallest species are those that belong to the family with the very long name, Trichopterygidæ, which signifies that they have wings fringed with hairs. One species was present in great numbers, and although mere black specks on the white paper the beetles are very nimble and run swiftly about. The members of the Cryptophagidæ and Lathridiidæ are also very small, and subsist upon fungi and decaying vegetation. One of the most interesting beetles of the list is the pretty little *Taphrocerus gracilis*, the only buprestid I have ever found hibernating. This species is taken with the sweeping net in low meadows in June and I believe the larva feeds in the stems of the sedges or large grasses. All the rest of the beetles are plant-feeding, and the most abundant species, *Phytonomus nigrirostris*, is known as a clover-pest.

HEMIPTERA.

<i>Corimalæna pulicaria Germ.</i>	5	<i>Coriscus inscriptus Kirby</i>	1
<i>Neotiglossa undata Say</i>	1	<i>Salda</i> sp. undescribed.....	1
<i>Cymus angustatus Stal.</i>	5	<i>Ulopa canadensis VanDuzee</i>	62
<i>Salicia pilosula Stal.</i>	3	<i>Acocephalus mixtus Say?</i>	6*
<i>Scolopostethus affinis Schill.</i>	2	<i>Helochara communis Fitch</i>	4*
<i>Lygus flavonotatus Prov.</i>	2	<i>Philaenus</i> sp.	1
<i>Corythuca arquata Say</i>	7	<i>Livia vernalis Fitch</i>	1
? sp.	17*		

NOTES ON THE HEMIPTERA.

The species of Hemiptera include ten belonging to the division Heteroptera and five to the Homoptera. They were more abundant in the drier mosses. Seven species were common to both localities and four peculiar to each. The total number of individuals was 118, of which more than half belonged to the curious short-winged species which Mr.

VanDuzee has named *Ulopa canadensis* and which has been noted previously as occurring in Ot'awa. Mr. Kilman has also found the species at Ridgeway, and it is probably widely distributed. The specimens marked with an asterisk were nymphs, or immature forms, so that the species could not be exactly determined. The insects belonging to this order are the only forms properly entitled to the name "bug," and they are mainly plant-feeding. Subsisting upon the juices, which they suck from the leaves and stems by means of the tubular beak formed by the prolongation of the mouth-parts, they rank among the insects most injurious to plant life, and are most difficult to destroy or keep in check. The smaller forms, known as plant-lice, are very numerous in species, and they multiply with great rapidity, so that a very brief time suffices for the attacked plant to become quite covered by the immense number in all stages of growth, and to have its vitality exhausted.

HYMENOPTERA.

PROCTOTRYPIDÆ.		PROCTOTRYPIDÆ -Continued.	
Megaspilus ottawaensis <i>Ashm.</i>	5	Trichopria sp. (apterous).....	2
Ceraphron minutus <i>Ashm.</i>	4	sp.....	1
flaviscapus <i>Ashm.</i>	2	Phænopria aptera <i>Ashm.</i>	16
carinatus <i>Ashm.</i> ?	5	hæmatobiæ <i>Ashm.</i>	10
mellipes <i>Ashm.</i> ?	2		
Aphanogmus bicolor <i>Ashm.</i>	8	MYMARIDÆ.	
Telenomus sp.....	1	Cosmocoma sp.....	2
Acoloides subapterus <i>Ashm.</i>	4		
seminiger <i>Ashm.</i>	1	FORMICIDÆ.	
sp. nov. ?	1	Camponotus marginatus <i>Latr.</i>	1
Bæus minutus <i>Ashm.</i>	47	Lasius brunneus <i>Latr.</i>	1
Prosacantha melanopus <i>Ashm.</i>	1	Tapinoma erraticum <i>Nyl.</i>	1
Hoplogryon brachypteris <i>Ashm.</i>	41		
sp. nov. ?	1	MYRMICIDÆ.	
Gryon canadensis <i>Ashm.</i>	68	Myrmica lobicornis <i>Nyl.</i>	14
borealis <i>Ashm.</i>	3	sp.....	1
Paramesius clavipes <i>Ashm.</i>	2		
Diapria sp.....	1		
Trichopria carolinensis <i>Ashm.</i>	4		

NOTES ON THE HYMENOPTERA.

That this order should be so well represented will probably be a matter of much more surprise than the occurrence of a large number of the ground-frequenting beetles. One is apt to think of its members, in their adult form at least, as delicate-winged forms flitting about in the sunshine. But besides the ants there are many wingless or sub-wingless forms belonging to the various parasitic groups. Nearly half of the species in the above list belong to these non-flying hymenoptera, but the remainder have fully developed wings. It will be seen that twenty-nine species are enumerated, of which five occurred in both localities, five at the Farm only (of which four were ants) and nineteen only in the swamp, which was decidedly the most prolific ground, yielding 218 out of the 250 specimens collected. Many more ants could have been collected, for their nests, some of considerable size, were scattered all through the swamp, but those secured were stragglers that had probably got lost in their wanderings, and had not been able to reach home before the cold weather stopped their journeyings. With the exception of these ants all the species are very minute, and belong to the family Proctotrypidæ; except one species belonging to the Mymaridæ, a small group formerly included in the Proctotrypidæ but which Mr. Ashmead considers should constitute a separate family. The first six species belong to the sub-family Ceraphroninæ, whose members are parasitic on Aphididæ (plant lice) and Cecidomyiidæ (midge-like flies forming gall-like swellings, etc.). The following ten species belong to the sub-family Scelioninæ, all of which are egg parasites, the larvæ living in the eggs of other insects. I have bred as many as thirty-one individuals of a species of Telenomus from two eggs of one of our large moths, but usually one parasite occupies each egg. Seven species belong to the sub-family Diapriinæ, parasites of the larvæ of flies. The most abund

ant form was the wingless *Gryon canadensis*, of which all but five specimens were from Dow's swamp. The closely allied, short-winged *Hoplogryon brachypteris* was almost as numerous, three of the specimens being from the Farm. The second in point of numbers was *Bæus minutus*, which occurred only in the mosses from Dow's swamp. Probably some individuals escaped my notice when I was sifting the moss, as it is much the smallest species in the list. It is a very agile atom, and able to leap a considerable distance, while even the least dust upon the paper suffices to hide it, as it is a mere speck itself. The whole forty-seven specimens placed head to tail would make a line hardly an inch in length. As the members of this genus are parasitic in the eggs of spiders this minute species will probably infest the eggs of some of our smaller spiders, but I have not yet succeeded in breeding any. The *Cosmocoma* is a fragile little form with narrow wings, interesting chiefly as being the first mymarid which has been captured by me, and probably the first recorded from Canada. In conclusion, it is hoped that these imperfect lists and notes thereon may stimulate further observations on the winter habits of Canadian insects.

BIRDS AS PROTECTORS OF ORCHARDS.*

By E. H. FORBUSH, ORNITHOLOGIST OF THE MASSACHUSETTS BOARD OF AGRICULTURE.

Having had, during the last twenty years, some opportunity for observing the food habits of birds, I have become convinced that they destroy enormous numbers of insects. This conviction gives rise to the question, to what extent are birds useful to man in this respect?

The present paper is merely a partial record of the results of an attempt to foster and protect birds in an old and neglected orchard with a view to observing the effect of such a policy upon the trees. The orchard is so situated as to be a favorite haunt for birds. It forms part of an estate in Medford, Mass., lying near the southern border of the stretch of wooded rocky hills known as the "Middlesex Fells," a large part of which is now under the control of the Metropolitan Park Commission of Massachusetts, and is being administered as a forest reservation. The nearest estates on the east and west of the orchard are cultivated to some extent. There are other orchards in the immediate vicinity, and many fine and large shade trees. There are also on the estate in question many varieties of trees and shrubs. There is a small piece of woodland, covering perhaps an acre and a half, in which yellow pine predominates, the other trees being principally ash, oak and maple, some hickory and a few white pines. A lane running along the southern border of the estate is bordered on both sides with elms and poplars. A line of mulberry trees along the lane south of the orchard affords tempting food for such birds as are fond of fruit in its season. There are also many wild cherries and berries of several varieties, together with half a dozen trees of cultivated cherries.

Among the trees, shrubs and vines found on the estate and which furnish food for birds in the shape of berries or seeds at certain seasons of the year are the *Berberis vulgaris* (common barberry), *Vitis labrusca* (northern fox grape), *Rhus toxicodendron* (poison ivy), *Prunus Americana* (wild yellow plum), *Prunus Pennsylvanica* (wild red cherry), *Prunus Virginiana* (choke-cherry), *Prunus ceyvum* (English cherry), *Rubus occidentalis* (black raspberry), *Rubus villosus* (high blackberry), *Rubus idæus* (garden raspberry), *Rosa nitida* (wild rose), *Pyrus malus* (common apple), *Ribes rubrum* (common red currant), *Fraxinus Americana* (white ash), *Morus rubra* (red mulberry), *Quercus alba* (white oak), *Quercus coccinea* (scarlet oak), *Pinus strobus* (white pine), *Pinus rigida* (pitch pine), *Thuja Canadensis* (hemlock), *Juniperus Virginiana* (red cedar).

The orchard itself is a typical old orchard, such as is often found on small farms. It has suffered greatly from neglect. Two-thirds of the original trees have died or are in the last stages of dissolution. This is largely the result of neglect and improper pruning. Dead limbs and hollows in the trees have offered nesting places for such birds as the wren, woodpecker and bluebird.

* Reprinted from *The Museum* by kind permission of the author.

For three years, from 1891 to 1893, inclusive, the trees were trimmed and cared for. They were sprayed or banded to protect them from canker-worms, and the "nests" of the tent caterpillar (*Clisiocampa Americana*) (Fig. 27), were removed. The result was a scanty yield of apples from most of the trees. One or two bore quite plentifully.

In order to observe the effect of the feeding of birds in the orchard, no care was taken in 1894 to protect the trees. During that year the tent caterpillars were very numerous in the vicinity, and it became evident also that a great increase in the the number of canker-worms was taking place in the neighborhood. Although these insects made considerable inroads upon the trees, they did not seriously injure the foliage anywhere except in one or two instances. No attempt was made previous to 1895 to foster or encourage the birds in the neighborhood, except that a few nesting boxes were put up in 1894, which were occupied in one case by a family of wrens, and in another by the English or house sparrow. We were careful, however, to destroy the nests of the house sparrow.

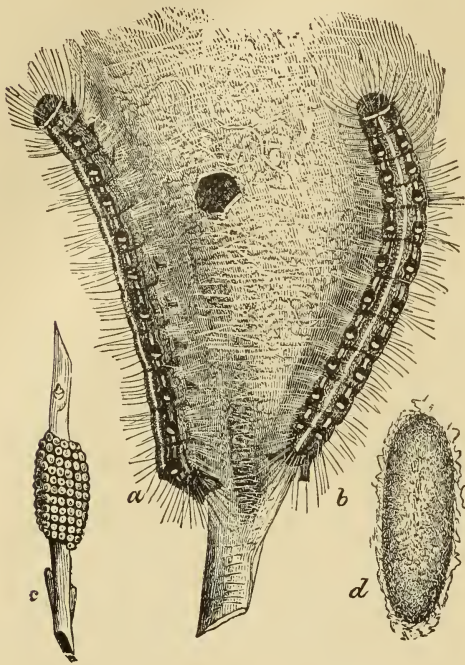


Fig. 27.

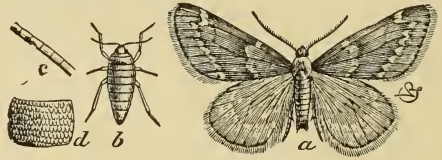


Fig. 28.

In the fall of 1894 it was noticed that immense numbers of the wingless females of the fall canker-worm (*Anisopteryx pomataria*) (Fig. 28, *b*), were ascending nearly all the trees and depositing their eggs; also, that the eggs of the tent caterpillar moths were numerous upon the twigs promising a plentiful supply for 1895.

Having allowed the insects one year to increase unmolested by man, we began in the winter of 1894-95 to encourage the presence of birds in the orchard.

In 1894 a small tree in the centre of the orchard had been enclosed by a high board fence. The tree thus enclosed was used as an outdoor experiment station for observation on the breeding and habits of the gypsy moth. During the winter 1894-95, Mr. C. E. Bailey made frequent visits to this tree to ascertain whether or not the birds were destroying the eggs of the gypsy moth. Incidentally, Mr. Bailey observed many interesting things in connection with the feeding of the birds on the eggs, larvæ and pupæ of insects which wintered on the trees, and I am greatly indebted to him for many interesting notes on the feeding of birds in this orchard. He is a careful, conscientious observer, and is intimately acquainted with most of our native land birds.

Hunters and trappers are aware that many species of winter birds, such as titmice, woodpeckers, crows, jays and nuthatches are attracted by a skinned carcass suspended from a limb, and will remain in the vicinity until all the bones are picked clean or until, with the approach of spring, insect food becomes more accessible.

Believing from my own observations that the chickadees (*Parus atricapillus*) were feeding on the eggs of the fall canker-worm, I asked Mr. Bailey to attract the birds, if possible, to the orchard by suspending pieces of meat, bone, suet, etc., from the trees.

These food materials are suitable for birds at times when the trees are covered with snow or ice and when, lacking such nourishment, they might starve. Although birds will frequently visit bait provided for them and in time will eat a considerable portion of the meat, they do not depend entirely on this aliment, but spend the greater portion of their time in searching for insects and eggs in the immediate vicinity.

Finding a plentiful supply of food, the chickadees remained about the orchard most of the winter, except for a week or two, when the meat gave out, but they were lured back again later by a fresh supply which was placed in the trees. Not only were the chickadees attracted to the orchard in large numbers, but other birds came also. A pair of downy woodpeckers (*Dryobates pubescens*) and two pairs of nuthatches (*Sitta carolinensis*) were frequent visitors, and a few brown creepers (*Certhia Americana*) came occasionally. All these paid frequent visits to the meat and suet, and also thoroughly inspected the trees in search of insect food. They made excursions also to the trees in the neighborhood, but the greater portion of their attention was confined to the orchard in which the bait was suspended. As they became more accustomed to Mr. Bailey's presence they grew quite tame, and could be viewed at a distance of a few feet: Indeed, chickadees frequently alighted on his person and occasionally took food from his hand. He was thus enabled to determine accurately (without killing them) what they were feeding upon, and was soon convinced that they were destroying the eggs of the canker-worm moth in large numbers, as well as the hibernating larvæ and pupæ of other insects injurious to trees.

To determine how many eggs a single chickadee would eat, a few birds were killed and their stomach contents examined, with surprising results. There was no difficulty in identifying the eggs of the canker-worm moth which were found in the birds' stomachs, as a great portion of the shells remained intact. The other insect contents of the stomachs

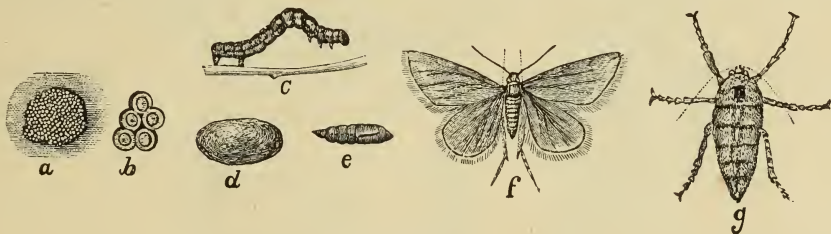


Fig. 29.

were identified for me through the kindness of Mr. A. H. Kirkland, B.Sc., assistant entomologist of the State Board of Agriculture, who made the examinations. Although it was impossible in all cases to learn with certainty the species to which certain insects belonged, it was evident that they belonged to the genera known to be of injurious habits.

I take the following from Mr. Bailey's notes :

Number of Eggs of the Fall Canker-Worm found in Stomachs of Chickadees.

No. 1	273 eggs.
" 2	261 "
" 3	216 "
" 4	278 "

Making in all 1,028 eggs found in the stomachs of four birds. Four birds killed later in the season had eaten the female imagos of the spring canker-worm (*Paleacrita vernata*), (Fig. 29, g), as follows :

No. 1	41 moths.
" 2	18 "
" 3	27 "
" 4	19 "

Making a total of 105. In No. 2, 3 and 4 of the last table there were a large number of eggs also. It is safe to say that there were 150 eggs in each stomach, in addition to the female moths eaten.

Mr. Bailey carefully counted the eggs in the ovaries of twenty of these female moths, with the following results :

No. 1.....	158	No. 11.....	111
" 2.....	272	" 12.....	160
" 3.....	127	" 13.....	193
" 4.....	184	" 14.....	131
" 5.....	218	" 15.....	281
" 6.....	135	" 16.....	242
" 7.....	140	" 17.....	116
" 8.....	220	" 18.....	281
" 9.....	200	" 19.....	192
" 10.....	130	" 20.....	217

It will be seen from this table that the average number of eggs found in each moth is 185. Mr. Bailey is very positive, from his continuous field observations, that each chickadee will devour on the average thirty female canker-worm moths per day from the 20th of March until the 15th of April, provided these insects are plentiful. If the

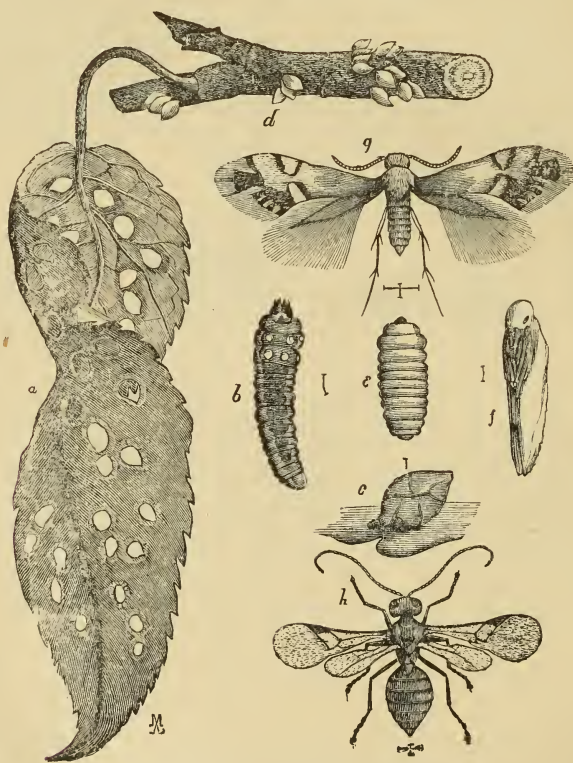


Fig. 30. (*Aspidisca splendoriferella*.)

average number of eggs laid by each female is 185, one chickadee would thus destroy in one day 5,550 eggs ; and in the twenty-five days in which the canker-worm moths "run" or crawl up the trees, 138,750. It may be thought that this computation is excessive, and it is probable that some of the moths were not captured until they had laid some of their eggs, but the chickadees are also busy eating these eggs. When we consider further that forty-one of these insects, distended as they were with eggs, were found at one time in the stomach of one chickadee, and that the digestion of the bird is so rapid that its

stomach was probably filled several times daily, the estimate made by Mr. Bailey seems a very conservative one. He now regards the chickadee as the best friend the farmer has, for the reason that it is with him all the year, and there is no bird that can compare with it in destroying the female moths and their eggs. It was noticed that the birds made no attempt to catch the male moths. This, however, cannot be considered as a fault, for the birds accomplish far more by destroying the females than they would by killing males.

The following notes from the preliminary examinations of the contents of the alimentary canal of chickadees made by Mr. Kirkland are of interest in this connection :

“Bird brought in by Mr. Bailey, March 16, 1895: Gullet empty. Gizzard contained 270 canker-worm eggs (*Anisopteryx pometaria*), forty-six case-bearers (microlepidoptera), six cocoons, Fig. 30*d*, of a small tineid (near *Aspidisca*). These three kinds of food in bulk composed eighty per cent. of the gizzard contents, the remainder being dark material which I was unable to determine under a hand lens. I think it very probable that part of this was bits of bark or particles of bark dust taken in with the eggs or cocoons. The intestine contained a large quantity of meat, seventy-five per cent., and 103 canker-worm eggs, ten per cent., the remainder, fifteen per cent., being material which I could not identify. It was not meat. This gives us as totals, 373 canker-worm eggs and fifty-one microlepidoptera.

“Specimens of so called ‘scales’ on apple twigs brought in by Mr. Bailey, March 12, 1895. These are not bark lice, but the cocoons of a microlepidopteron, probably a tineid. Length 1-12 to 1-8 inch: width, 1-12 to 1-10 inch; elliptical, dark brown or reddish brown. They are closely spun, the upper surface apparently being of leaf epidermis, while underneath is a small well-formed cocoon which contains a minute green larva which evidently hibernates as such, probably pupating in the spring. The larva undoubtedly feeds on the leaves of the apple-tree, as these cocoons were taken from the small twigs at the extreme end of a large branch. Some of these cocoons are empty and have a minute hole at one end, which probably served for the egress of some small parasite. These cocoons are eaten by the chickadee, and have been found in the gizzard of the birds.”

The case-bearers and the tineids or leaf miners are injurious to the foliage of the apple-trees.

It was noticed by Mr. Bailey, who watched the birds closely for several days, that they were eating quantities of both of these insects. It would have been impossible for any one to determine the species of the leaf miners as found in the birds' stomachs, for little remained but small fragments of the shell of the creature. Mr. Bailey noticed that the birds were taking objects from the twigs, some of which they ate; others they rejected and dropped upon the snow. Some of those dropped he picked up and examined, finding them to be parasitized. The birds undoubtedly ate only those which were alive.

It was evident from a careful examination of the eggs found in the stomachs of the chickadees that they were either broken by the bill in such a way that the contents were exposed to the action of the gastric juice or the gastric fluid destroyed a portion of the shell. Occasionally a few eggs which appeared to be whole were found in the intestines.

A great quantity of animal food is required to sustain life and provide animal heat sufficient to enable these little birds to resist the inclemency of our severe winters. In proof of this it may be stated that during favorable weather the birds visited the meat and ate largely of it three times each hour with fair regularity. During each interval they were occupied in destroying eggs and other hibernating insect forms which were always present and numerous in the stomachs examined. This feeding appeared to be almost continuous except in severe storms when the birds sought shelter or when they were laboring under excitement caused by fear, as in the case of a visit from a hawk, cat or shrike. Whenever a cat appeared they immediately hid behind the branches and remained quiet until the intruder had passed. The appearance of other enemies or the firing of a gun would produce much the same effect.

The woodpeckers and nuthatches which frequented the orchards, were not seen to eat the eggs of the canker-worm moth. As they were not numerous, none were killed. Mr. Bailey observed, however, that the nuthatches were eating scales which they found on the limbs of the apple-trees in a neighboring orchard. In relation to these scales the following note from Mr. Kirkland is of interest :

“March 20, 1895 Mr. Bailey brought in specimens of apple twigs infested with the Bark Scale louse, *Mytilaspis pomorum*, Fig. 31. He reported that the nuthatch was feeding on them. These twigs were infested in a worse manner than I have ever seen before. They were literally covered with the scales. On one small twig, one-half inch in diameter, I counted 367 scales on one inch of the twig. The eggs contained in a number of scales varied from sixty-two to eighty-two, with an average of seventy.”



Fig. 31.

These scales, when numerous, are very injurious to the apple-tree. Each scale covered a dead female of the preceding year and the hibernating eggs, many of which must have been disposed of by the nuthatches. I was shown, both by observation and dissection, that birds feeding in the same neighborhood and upon the same trees showed considerable variance in the character of their food. Kinglets taken, had no canker-worm eggs, but had eaten largely of bark borers. Woodpeckers seemed to confine themselves to the larvæ of borers and to wood-ants and other insects which bore into the wood of the tree. Chickadees and nuthatches ate the pupæ and eggs of insects found upon the bark or in the crevices of the trunks. No birds were seen to eat the eggs of the tent caterpillar, nor were any found in the stomachs of any of the birds examined. It seems probable that these eggs are so protected by a hard covering that they are not eaten by most birds.

It is impossible, in the limited space at our command, to give results of all observations and dissections in detail. We can merely give the apparent results of the presence of the birds in the orchard.

It was found that these birds were not only destroying the eggs of the canker-worm in this orchard, but were feeding on the eggs of the same insect in the woods where bait had been suspended.

As the frost left the ground on the first warm days of spring the wingless females of the spring canker-worm moth appeared in the orchard and began ascending the trees in great numbers. The chickadees commenced catching and eating the females and their eggs. Mr. Bailey placed twenty-two of the females on one tree, and in a few minutes twenty of them were captured and eaten by chickadees.

It was noticed as spring approached and insects became more numerous that the chickadees came very seldom to the meat. They were not as assiduous in their attention to the orchard, and a small portion of their food consisted of the early gnats which were flying on bright sunny days. In early April they had nearly deserted the meat, although they still frequented the orchard in search of the female canker-worm moths. They seemed to prefer animal food to all other, and even in cold weather would hardly notice grain or seeds of any kind, though one individual ate a few oat kernels which were placed near his accustomed feed of meat.

Towards the last of April the English or house sparrow (*Passer domesticus*) began to make its appearance in the vicinity and apparently drove the chickadees to the woods, as they disappeared and did not nest in the orchard, but remained in the woods, where they paired and nested.

I believe that the English sparrow is largely responsible for the fact that chickadees are not now found nesting in our orchards. Though they still nest in the orchards on the remoter farms and in the villages where the English sparrow is not numerous, they seem to have disappeared in summer from orchards near cities. At the time of the advent

of the sparrow in this locality, twenty-five years ago, chickadees were often found nesting in old apple trees in the orchards in this region where now scarcely any are to be seen in orchards during the summer.

In the latter part of April and in early May the tent caterpillars made appearance on the apple and cherry trees in the neighborhood. Canker-worms were also numerous on the apples and elms and appeared in some of the other trees. It was noticed, however, that while trees in neighboring orchards were seriously infested with canker-worms and to a less degree with tent-caterpillars, those in the orchard which had been frequented by the chickadees during the winter and spring were not seriously infested, and that comparatively few of the worms and caterpillars were to be found there.

With the warm south winds of May, many summer birds came and settled in the neighborhood and prepared to build their nests, among which the following were seen: Chickadee (*Parus atricapillus*), Tree Sparrow (*Spizella monticola*), Crow (*Corvus Americanus*), Purple Grackle (*Quiscalus quiscula*), Flicker (*Colaptes auratus*), Red-winged Blackbird (*Agelaius phœniceus*), Robin (*Merula migratoria*), Chipping Sparrow (*Spizella socialis*), Ovenbird (*Seiurus aurocapillus*), Wood Thrush (*Turdus mustelinus*), Catbird (*Galeoscoptes carolinensis*), Brown Thrasher (*Harporhynchus rufus*), Black-billed Cuckoo (*Coccyzus erythrophthalmus*), Yellow-billed Cuckoo (*Coccyzus Americanus*), Black and White Warbler (*Mniotilta varia*), Yellow Warbler (*Dendroica œstiva*), Chestnut-sided Warbler (*Dendroica Pennsylvanica*), Black-throated Green Warbler (*Dendroica virens*), Pine Warbler (*Dendroica vigorsii*), House Wren (*Troglodytes œdon*), American Redstart (*Setophaga ruticilla*), Nashville Warbler (*Helminthophila ruficapilla*), Golden-winged Warbler (*Helminthophila chrysoptera*), Scarlet Tanager (*Piranga erythromelas*), Rose-breasted Grosbeak (*Habia ludoviciana*), Baltimore Oriole (*Icterus galbula*), Blue Jay (*Cyanocitta cristata*), Least Flycatcher (*Empidonax minimus*), Wood Pewee (*Contopus virens*), Phœbe (*Savornis phœbe*), Kingbird (*Tyrannus tyrannus*), and Downy Woodpecker (*Dryobates pubescens*).

It was noticeable that early in the season, when the webs of the tent-caterpillar (Fig. 27) first appeared on the apple and cherry trees, the orioles attacked them and devoured a considerable number of the hairy young larvæ. A little later, when the canker-worms became more numerous, it seemed as if all the birds in the neighborhood were intent on eating canker-worms, neglecting to a certain extent the hairy caterpillars. The cuckoos, however, seemed to feed impartially on both the canker-worm and the tent caterpillar.

Birds from all quarters in the wood and swamp, orchard and field, flocked into the trees infested by canker-worms, and there spent a considerable portion of their time. In a short time the few canker-worms remaining in the old orchard were apparently eaten by birds, and the birds then directed their attention to the neighboring orchards, which were swarming with the worms. It soon became evident that these orchards would be entirely stripped of their leaves, while the old orchard retained its full foliage. Thus it was seen that the trees to which the chickadees had been lured during the winter had been so well protected that the summer birds were able to destroy the few remaining larvæ, while the trees at a distance from these contained so many larvæ that the birds were not numerous enough to dispose of them or to make any effective reduction in their numbers. This apparently demonstrated the usefulness of the egg-destroying winter birds, and showed the wisdom of attracting them to the orchard during the winter months. Not only did nearly all species of birds in the neighborhood flock to the trees infested by the canker-worms, but the chickadees, living in their retirement in the woods, came out to the orchards, flying some distance to procure canker-worms with which to feed their young, and making regular trips to the infested trees day after day.

On May 18, Mr. Bailey saw a female chickadee carry twenty larvæ to its nest. They were apparently all canker-worms but two, which were tent caterpillars. Of this he is certain, for he was within three yards of the nest to which the larvæ were taken. Later, on May 31, he noticed the chickadees feeding their young. It was evident that a large portion of the food consisted of canker-worms. The birds each made a trip to the nest about once in twelve minutes. The male and female came at nearly the same time

and went away together. They went in the direction of an orchard infested by canker-worms. A few of the larvæ were dropped on the ground at the nest and proved, on examination, to be canker-worms.

The crow was also observed feeding on the canker-worms.

On May 22 the birds had nearly all stopped feeding in the neighboring woods and were in the orchards feeding on canker-worms.

Early in June, when the remaining canker-worms had finished their transformations and retired to the ground, several species of birds were again noticed feeding their young on the tent and other hairy caterpillars. Of these, three species (both cuckoos and the Baltimore oriole) seemed to be the most useful. On May 17, a cuckoo was seen to take eleven caterpillars out of one nest. Mr. Bailey writes: "On May 10, a black-billed cuckoo came into a tree near me at 3 p.m. and sat there until 4.40 p.m., then he went straight to a tent caterpillars' nest. He looked it over for a short time and then commenced eating the caterpillars. He picked twenty-seven caterpillars out of the nest before he stopped. The bird ate them all and did not drop one. Then he went to the tree, in which, I believe, he remained during the night, for on Saturday, the 11th, I found the bird in the same tree, and in almost the same place, at 5 a.m."

The orioles, chickadees and vireos often pecked the caterpillars to pieces and ate portions of them, seemingly feeding to a considerable extent on the internal organs. This being the case, it is quite evident that the stomach contents cannot be depended upon entirely to determine the character of the food of these birds, as no one is expert enough to identify the internal organs of caterpillars with such certainty as to determine the species to which they belong.

The following is a list of the birds seen feeding on the tent caterpillar :

Crow (*Corvus Americanus*), Chickadee (*Parus atricapillus*), Oriole (*Icturus galbula*), Red-eyed Vireo (*Vireo olivaceus*), Yellow-billed Cuckoo (*Coccyzus Americanus*), Black-billed Cuckoo (*Coccyzus erythrophthalmus*), Chipping Sparrow (*Spizella socialis*), Yellow Warbler (*Dendroica aestiva*).

During the month of May an attempt was made to render the place as attractive to birds as possible. The undergrowth, which previous to 1894 had been trimmed out, was afterward allowed to grow, and in 1895 several low thickets had been thus formed. The mulberry-trees were stimulated by judicious trimming, and bore a considerable crop of early fruit which ripened in advance of the cherries, thus drawing the attention of the fruit-eating birds away from the cherries, and serving to attract them to the vicinity of the orchard. Ten nesting boxes were put up for the wrens and bluebirds; but as the bluebirds were very rare this season none came to the orchard. Two families of wrens, however, were reared in the boxes in place of one family last year. Nesting materials—strings, hair and straw—were hung in the trees and scattered about. Several marauding cats were killed, and an attempt was made to keep nest-hunting boys away from the neighborhood as much as possible. Thirty-six nests of birds were discovered in the neighborhood, as follows: Three red-eyed vireos, ten robins, four Baltimore orioles, three cuckoos, five chipping sparrows, three least flycatchers, two redstarts, two yellow warblers, two chickadees, two house wrens.

Of these all but three were destroyed probably by boys, the nests being torn down and the eggs missing. The three which escaped destruction were two wrens' nests which had been built in boxes upon buildings, and a robin's nest in a maple tree within ten feet of a chamber window. This wholesale destruction of nests discouraged several pairs of birds, and they disappeared from the neighborhood. Those remaining built new nests, and after a second or third attempt a few succeeded in rearing young. One nest of orioles escaped the general destruction, and the birds were busy for a long time carrying canker-worms to their young. One of them was noticed to take eleven canker-worms in its beak at one time, and fly with them to the nest. The vireos, warblers, chickadees, cuckoos, orioles and chipping sparrows were particularly active in catching canker-worms, and the English sparrow killed them in considerable numbers.

If the thirty-six pairs of birds whose nests were found had succeeded in raising their young, it is probable that they would have disposed of most of the canker-worms in the neighborhood. Five thousand of these larvæ are sufficient to strip a large apple-tree. One hundred and eight young would have been reared, had each pair of birds raised three. According to Professor Augley's experience, sixty insects per day as food for each bird, both young and old, would be a very low estimate.* Suppose each of these one hundred and eight birds had received its sixty insects per day, there would have been 6,480 caterpillars destroyed daily. The destruction of this number of caterpillars would be enough to save the foliage and fruitage of one apple-tree. In thirty days the foliage of thirty apple-trees could have been saved, or 194,400 canker-worms destroyed. This does not include what the old birds themselves would have eaten.

In these observations, the influence of insect parasites and predaceous insects has not been entirely ignored. Hymenopterous parasites were not seen to be numerous, and as it was a year when canker-worms were on the increase, it is not probable that these parasites would have been a prime force in reducing the numbers of the canker-worms had the birds not been present. Even had they been numerous they would have had little effect in checking the ravages of the canker worm during the present year, as their interest is identical with that of the canker-worm, and they remain in its body until it has finished feeding, allowing it to defoliate the trees before completing their deadly work upon it.

We do not know to what extent such parasites are devoured by birds. This we could not ascertain without shooting the birds, which would have defeated our main object. No parasites of the tent caterpillar or canker-worm were found in the stomachs of the few birds which were examined. It is hardly safe to draw conclusions from observations so limited in their scope, but we may infer from what was observed that the egg-eating birds are of the greatest value to the farmer, as they feed almost entirely on injurious insects and their eggs, and are present all winter when other birds are absent. The summer birds which attack the larvæ are valuable also if they can be so protected and fostered as to become sufficiently numerous to do the work required. It is evident also that a diversity of plants which encourages diversified insect life, and assures an abundance of fruits and seeds, as an attraction to birds, will insure their presence. In this connection, I wish particularly to note the fact that the mulberry-trees, which ripen their berries in June, proved to be a protection to the cultivated cherries, as the fruit-eating birds seemed to prefer them to the cherries, perhaps because they ripen somewhat earlier.

I believe it would be wise for the farmer to plant rows of these trees near his orchard, and it is possible that the early June berry or shad berry (*Amelanchier Canadensis*) might also be useful in this respect. It is a handsome shrub or tree, flowering early in the season, and would be attractive at a time when other trees and shrubs are not in bloom.

At the present time, July 23, 1895, the trees in the orchard appear to be in good condition. They have not suffered from the slight pruning of their foliage which was effected by the few caterpillars and canker-worms which survived. The fruit is well set, and it now remains to be seen whether the birds will have any considerable effect in preventing the ravages of the codling moth. No other orchard in the neighborhood will produce any fruit this season, with one exception. The nearest orchard, situated directly opposite on the estate across the way, has not been ravaged by the canker-worms. This exemption is due principally to the efforts of the owner, who has banded his trees with tarred paper and has used tree ink faithfully and well upon the paper. He has also taken pains to clear the nests of the tent caterpillar from the trees. This orchard, being nearest to the one visited by the chickadees, was also an object of their attention, and this may account somewhat for the reduction of the pests in this place.

The record of these observations, incomplete as it is, is given for what it is worth as a contribution to the literature on this most interesting and important subject.

* 1st Rep. U. S. Ent. Com. 1877, p. 342.

THE ROCKY MOUNTAIN LOCUST AND ITS ALLIES IN CANADA.

BY SAMUEL H. SCUDDER.

The genus *Melanoplus*, to which the Rocky Mountain Locust belongs, forms part of a small group of genera first definitely separated a few years ago by Brunner von Wattenwyl under the name of *Pezotettiges*, but which, for reasons given in a technical memoir now in press, I have preferred to call after the dominant genus just mentioned,—*Melanopli*.

In the last resort, the *Melanopli* are separated from their nearest allies only by such an apparently insignificant matter as the number of spines (in itself variable) found on the outer margin of the hind tibiæ; these, save for individual exceptions, often on one side of the body only, are always at least nine in number and rarely exceed fourteen. In the known Canadian species they range from eight to thirteen, but ten or eleven is the almost invariable number.

The *Melanopli* are an almost exclusively American group comprising more than thirty genera of which only one, *Podisma*, occurs in the old world. They are primarily divided into two sections, dependent on the shape of the subgenital plate of the males, a division

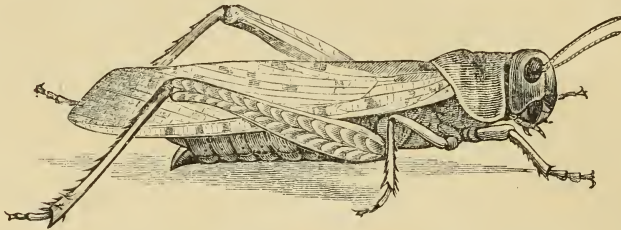


Fig. 32. Locust (magnified.)

which broadly but not exactly separates the tropical or subtropical genera from those of the temperate regions, and leaves an almost equal number of genera in each section. Of the tropical section, as it may be called, but a single genus is known in Canada, *Hypochlora*; its single species *H. alba* (Dodge) is reported by Brunner as occurring in Manitoba, and this is altogether probable as it ranges along the border in the United States from Minnesota to Montana, but extends south only to Kansas and Colorado. It is a slender, hoary green, long-legged insect with abbreviated tegmina, and is partial to the white sage, *Artemisia ludoviciana*.

Of the temperate section, only three of the genera are actually known to inhabit Canada, though, as we shall see, there is little doubt that others will be found there. One of these is *Podisma*, formerly known as *Pezotettix**, a genus remarkable among the *Melanopli* for its longitudinal range, which is around the globe north of Lat. 35° N.; for its penchant for high altitudes, many of the species occurring only above or at the forest line on high mountains; and for the wide separation of its sternal lobes, though this alone will not separate it from all *Melanopli*. Moreover its organs of flight are never completely developed and may often be altogether wanting, as may then also, though in none of our American species, the tympanum found on the sides of the first abdominal segment; as this tympanum is regarded as an auditory apparatus, and as the power of producing sound is gone with the loss of the tegmina (against which the femora are scraped,) the absence of the tympanum in some apterous European species would seem to indicate that they had departed the more widely from the original type, and had therefore a longer history behind them.

* See Psyche, vii, 195.

Up to the present time more species of *Podisma* are known from the old than from the new world ; in the latter they are not known over a continuous territory, but over two large areas, one in the east and one in the west. That in the east is inhabited by only two species, one of which is only known from Ithaca, N.Y., at less than 500' above the sea, while the other, the better and long known *Podisma glacialis* (Scudd.) was first found at the timber line in the white mountains of New Hampshire, and has since been obtained at high elevations 2-4500' above the sea, in Maine on Ktaadn and in the country about the Megalloway, in New Hampshire on Kearsarge in Bartlett, in Massachusetts on Greylock in Berkshire county, and in New York in the Adirondacks ; while Mr. James Fletcher and I came across it at the edge of the town of Sudbury in Ontario. It will doubtless be found also in Quebec if sought in the proper places ; it is not found upon the ground but upon bushes, in the white mountains on the dwarf birch. Bruner also credits it to "British America," but I do not know from what point he received it, and on enquiry I find it was probably a mistake.

The western area from which *Podisma* occurs has half a dozen species, which range along the rocky mountains from New Mexico to Alberta ; all of the species are found on the mountain slopes or in Alpine valleys, and most of them at or above the timber line. A single species only is known to inhabit Canada, *Podisma Oregonensis* (Thom.) which has been taken at Fort McLeod in Alberta, and is also known from Montana, Idaho and Oregon. It is highly probable that other and possibly new species will be found in the Canadian Rockies ; it is especially likely that *Pod. dodgei* (Thom.) one of the commonest alpine orthoptera in Colorado, and known also from Wyoming and Montana, will occur near timber line in Canada.

A second genus of the section which occurs in Canada is *Phœtaliotes*, a group founded by me for a single species, the somewhat anomalous insect *Phœtaliotes Nebrascensis* (Thom.) of which *Pezotettix megacephala* Thom., *Pezotettix autumnalis* Dodge, and *Caloptenus volucris* Dodge, are all synonyms. It has a large, prominent, tumid head, which with a subsellate pronotum gives it a peculiar appearance ; it is strikingly dimorphic, full-winged and half-winged, which accounts for a part of the synonymy. In Canada it has been found only in Alberta at Fort McLeod and in Assiniboia at Medicine Hat, but it ranges from here, skirting the eastern slope of the Rocky Mountains, to Texas and even to Central Mexico. I have not seen the long-winged form, *volucris*, from Canada, but it occurs from Mexico to Montana.

We have left for the last (though in systematic sequence it should have preceded *Phœtaliotes*) the typical, dominant genus *Melanoplus*, which contains most of the known Canadian species. This genus is so strikingly dominant as to contain more than one-half of the known *Melanopli* of the world. In the memoir referred to at the outset, I have described in detail no less than 131 species, all from North America and all but a very few found within the limits of the United States ; it finds its principal home in the west, and it is to this genus that the Rocky Mountain Locust and several other minor depredators belong. To handle the genus properly I found it advisable to separate it into twenty-eight groups or series, defined mainly in terms of the male abdominal appendages, which here attain a striking and highly diversified development, and to name the groups after the predominant or older species contained in it. In that order I will present them also in the present account. Many of these species have before been placed under *Pezotettix* (*Podisma*) when I and others were accustomed, without careful discrimination, to look upon all the short-winged forms as belonging to that genus and the long-winged ones to *Melanoplus*. As some species are dimorphic, either fully winged or practically unable to fly from the brevity of the alary organs, that custom had its disadvantages, and a careful study of our entire *Melanoplan* fauna became a great desideratum, which I trust I may be found to have successfully filled in the paper before referred to.

In the *Glaucipes* series, there is a single species, *Mel. kennicottii* Scudd., a very small full-winged insect, which must be tolerably widespread in Canada, since it has been brought from the Yukon river in Alaska and the Souris river in Assiniboia, and occurs also in Montana.

In the *Utahensis* series, *Mel. bruneri* Scudd., a new species of about the size and general appearance of *Mel. femur-rubrum* but the male with a strongly upturned, apically broad subgenital plate occurs in Alberta at Fort McLeod, and extends from there southward to Nebraska and Colorado, and westward to Washington.

But it is in the *Spretus* series that the largest number of Canadian species appear. Most of them are closely allied to *Mel. atlantis*. Here are, first, *Mel. Alaskanus* Scudd., a new species found in Alaska and taken also at Spilmacheen, British Columbia; next, *Mel. affinis* Brun., another new species found in British Columbia, Washington, Utah and Wyoming; then, *Mel. bilituratus* (Walk.), a common species on Vancouver Island, as well as on the mainland in British Columbia, and over the border in Washington, Oregon, Nevada and Montana; *Mel. atlantis* (Riley,) an extremely abundant insect, occurring throughout the breadth of Canada, from Sable Island, off Nova Scotia, to Vancouver; it extends northward to the Yukon river in the west, though in the east I have only seen or heard of it as far north as Quebec, Ottawa, Sudbury and Lake Winnipeg; and finally, *Mel. spretus* (Uhl.) the Rocky Mountain Locust, the arch-destroyer, whose home is in the high plateaux of the Rocky Mountains and their eastern versant as far north as the Saskatchewan, and which now and again ravages the country to the east by its migrating hordes.

In the *Dawsoni* series there are two Canadian species: *Mel. Dawsoni* (Scudd.) which occurs in Canada from Manitoba to Alberta, and has two forms, long-winged and short-winged. Only the latter has been found in Canada, and the species ranges to New Mexico. The other Canadian species is *Mel. Gladstoni* Brun., which has been found at Medicine Hat in Assiniboia, and southward to Nebraska. Both these species are small and inconspicuous.

In the *Fasciatus* series are also two Canadian species: *Mel. fasciatus* (Walk.) widespread in Canada, having been reported or seen by me from Newfoundland, Labrador north of the Straits of Belle Isle, Anticosti, Hudson Bay, Lake of the Woods, Manitoba, Saskatchewan, Assiniboia, Alberta and Alaska. It also occurs in the United States everywhere near the Canadian border, from ocean to ocean, and as far south as New Jersey, Missouri and Colorado. It again is dimorphic, but the wings in the brachypterous form are not very short, and the full-winged form is known only from Michigan. The second species of this group is the only Canadian species not found in the United States, *Mel. borealis* (Fieb.) I have seen it only from the barren grounds of northern Labrador, but it is also reported from Hudson Bay and Greenland. It has slightly abbreviated organs of flight.

In the *Femur-rubrum* series the well known *Mel. femur-rubrum* (DeGeer), Fig. 33 occurs over nearly the whole of Canada, from ocean to ocean, wanting only in some northernmost localities, such as Labrador; and a second species, *Mel. extremus* (Walk.), ranges from Quebec to the Yukon and is dimorphic, though the organs are half as long as the body in the brachypterous type. The macropterous form seems to affect high altitudes or latitudes. I have seen specimens from the Alpine districts of the White Mountains and from Arctic America, among other places.



b
Fig. 33.

In the *Angustipennis* series the only Canadian species is *Mel. coccineipes* Scudd., a new species of moderately large size, found not uncommonly in Nebraska, Kansas, Colorado and Utah, and of which I took some specimens in company with Mr. Fletcher, at Nepigon, Lake Superior.

Mel. packardii Scudd., is the only Canadian species of the *Packardii* series, but this occurs abundantly from Assiniboia to British Columbia. South of the border it occurs over most of the United States west of the 100th meridian.

In the *Collinus* series, where all the males have forked cerci, there are several Canadian species: *Mel. alpinus* Brun., a very small new species, which ranges from Alberta to British Columbia, and is also known from Idaho; *Mel. infantilis* Scudd., a still smaller form, originally described from Colorado, but found also in Assiniboia (Medicine Hat).

and Alberta (Fort McLeod); and *Mel. minor* (Scudd.), a tolerably common species in the United States from Maine to the Rocky Mountains, and which was long ago sent from Red River, Manitoba, by Robert Kennicott and Donald Gunn.

Finally, in the *Bivittatus* series, where the species are large (the largest of those found in Canada), we find *Mel. femoratus* (Burm.) which ranges from Nova Scotia to British Columbia, and extends as far north as Hudson Bay. In the United States it extends southward nearly to the Ohio, and on the Atlantic coast even to North Carolina, while in the west it is nearly confined to the northern tier of states, though it reaches along the Rockies to Colorado and along the Sierras to northern California. A second species, intimately related to the other, but with parti-colored instead of clear red hind tibiæ, *Mel. bivittatus* (Say), is a more southern form, but it occurs with the first in many places, and, in Canada, accompanies it from British Columbia to Manitoba, but not eastward.

It thus appears that ten of the twenty-eight series found in the genus *Melanoplus* occur in Canada, though but twenty species, or less than one-sixth of the known forms, are included in the list. The list is remarkable for three things: 1, the range of structural diversity as indicated by the number of series represented; 2, the total absence of all species with excessively abbreviated tegmina (*i.e.* only as long or scarcely longer than the pronotum), such as would formerly have been placed unquestioned in *Pezotettix*, the single one of the known Canadian *Melanopli* with such tegmina being a true *Podisma*; 3, that it includes three of the only four well marked cases of wing-dimorphism in the genus *Melanoplus*. It is true that both the dimorphic forms have not been found in Canada, but that is in all probability a mere accident, collections from Canada being much rarer. The dimorphism is probably co-extensive or nearly so with the species.

But it should not be concluded that the above list actually offers a fair idea of the true *Melanoplus* fauna of Canada. Canada is so little explored from a natural history standpoint, especially in its western portions where, in the United States, *Melanopli* are so very strikingly diversified, and so many additional forms have been found next the Canadian border, that we must believe that many of them surpass it and are not now known as Canadian, simply from the little attention paid in Canada to this order of insects. We propose, therefore, to conclude this account by a brief review of such *Melanopli* as may be looked for with some confidence; we shall discover the probability of a much more varied and numerous series, for the number of genera and species will both be doubled, and the "series" of the genus *Melanoplus* represented raised from ten to seventeen. All the additional genera, however, belong to the temperate section.

In the first place we may cite *Hesperotettix* as a probable inhabitant, since *Hesp. pratensis* Scudd., is widely diffused along the northern margin of the United States, from Minnesota to Washington, being recorded in my paper from these two States and all the intervening ones.

Then there is the genus *Bradynotes*, containing peculiarly broad-chested, robust forms with mere pads for tegmina, all the species of which are confined, so far as known, to the extreme northwest of the United States,—Washington, Oregon, Northern California and Idaho, with Nevada, Montana and Wyoming. No less than four species are found in Washington and two others in Idaho, besides one confined to California, so that it seems altogether probable that one or more of them may be found in British Columbia, if indeed this district do not prove to have its peculiar species.

The genus *Edaleonotus*, founded by me on the species I formerly described as *Pezotettix enigma*, a clumsy bodied insect with tumid prozona and stout femora, and strikingly dimorphic in its tegmina, ranges on the Pacific coast from Southern California to Northern Washington where it is abundant, and it may almost surely be looked for in British Columbia.

Another new genus, *Asemoplus*, created for the reception of Bruner's *Bradynotes Montanus*, a relatively slender form, likewise with lobiform tegmina, has been found hitherto only in Montana and Washington and not further south, so that it probably ranges northward across the boundary.

To turn to the genera known to be represented in Canada, we have already mentioned the probability that *Podisma dodgei* (Thom.) would occur in the Canadian Rockies; and it is by no means improbable that new species of this genus will also be found.

But for the bulk of the suspects we must naturally turn to the genus *Melanoplus*. Here, in the *Flabellifer series*, we have *Mel. occidentalis* (Thom.) known from Minnesota, North Dakota, Wyoming and Montana; and *Mel. flabellifer* Scudd., occurring in Wyoming, Montana and Idaho.

In the *Spretus series*, *Mel. intermedius* Brun., occurs abundantly in Wyoming, Montana, Idaho and Washington, and is, therefore, likely to occur in Alberta and British Columbia.

The *Indigenes series* is composed of a single and new species, *Mel. indigenes*, which comes from Idaho and may reasonably be looked for a little further north.

The *Mancus series* is another group not yet discovered in Canada, but which may be looked for, as two species, *Mel. Artemisiae* (Brun.) and *Mel. mancus* (Smith) are found on its confines: the former in the west on sage brush in Idaho; the latter in the east in Maine and New Hampshire.

In the *Dawsoni series*, an additional species may be looked for, viz: *Mel. militaris* Scudd., which occurs in Idaho.

Several species also of the *Rusticus series*, a group not yet recognized in Canada, probably occur therein: *Mel. Montanus* (Thom.) found in Montana, *Mel. Washingtonianus* (Brun.) known now only in Washington, and *Mel. altitudinum* (Scudd.), which occurs at high elevations in Wyoming, South Dakota and Montana.

Of the *Borckii series*, *Mel. borckii* (Stal.) is found in Washington, Idaho and Montana.

So, too, in the *Fasciatus series*, *Mel. saltator* (Scudd.) occurs in the same States and in Wyoming, and may confidently be expected to extend across the border.

The *Alleni series* contains but two species, one of which, *Mel. Alleni* (Scudd.) occurs in Iowa and Dakota.

One of the representatives of the *Cinereus series*, *Mel. cinereus* (Scudd.) is of a very wide range, and is known from Washington, Idaho and Wyoming in places very similar to those abundant over the border in the sage-brush district.

Finally the *Collinus series* has probably other representatives in Canada, since *Mel. luridus* (Dodge) occurs abundantly in Washington, Montana, Dakota and Wyoming, and *Mel. collinus* (Scudd.) is found in equal numbers in Maine and New Hampshire.

A considerable number of these species have tegmina no longer than the pronotum, so that should eventually all of them be found in Canada, what has before been said on this point regarding Canadian species would need to be materially modified. But in any event it seems plain that the Canadian fauna will prove much richer in species and genera than we now know it to be.

It should be added that many of the species mentioned above are as yet unpublished and are not always so specified; descriptions of all are in press.

SEVENTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.*

The Association met in room 4, High School building, Springfield, Mass., August 27th, 1895. The following officers and members were present :

President John B. Smith, New Brunswick, N. J. ; Vice-President, C. H. Fernald, Amherst, Mass. ; Secretary, C. L. Marlatt, Washington, D. C. ; R. A. Cooley, Amherst, Mass. ; G. C. Davis, Agricultural College, Mich. ; E. H. Forbush, Malden, Mass. ; L. O. Howard, Washington, D. C. ; A. H. Kirkland, Malden, Mass. ; J. A. Lintner, Albany, N. Y. ; C. V. Riley, Washington, D. C. ; P. H. Rolfs, Lake City, Fla. ; F. A. Serrine, Jamaica, N. Y. ; E. B. Southwick, Central Park, New York City ; F. M. Webster, Wooster, Ohio ; C. M. Weed, Durham, N. H.

There were also in attendance upon the meetings members of other scientific associations and entomologists not members of the Association, among the latter Mr. George Dimmock and Professor Macloskie. The attendance at the different meetings ranged from 20 to 40.

The Association was called to order by the President and reports from officers listened to. The amendment to the constitution proposed by Mr. Summers, November 13th, 1890, but not afterwards taken up, was adopted. It reads as follows :

SEC. 3. The membership shall be confined to workers in economic entomology. All economic entomologists employed by the General or State governments, or by the State experiment stations, or by any agricultural or horticultural association, and all teachers of economic entomology in educational institutes, may become members of the Association by transmitting the proper credentials to the Secretary and by authorizing him to sign their names to this constitution. Other persons engaged in practical work in economic entomology may be elected by a two-thirds vote of the members present at any regular meeting of the Association. Members residing out of the United States or Canada shall be designated foreign members. Foreign members shall not be entitled to hold office or to vote.

The following persons were elected active members of the Association :

Mr. W. Hague Harrington, Ottawa, Canada ; Mr. R. E. Palmer, inspector of fruit pests, British Columbia. Proposed by Mr. Fletcher.

Mr. W. S. Bullard, Bridgeport, Conn. ; Mr. John Gifford, State forestry agent, Mays Landing, N. J. Proposed by Mr. Howard.

Mr. E. A. Schwarz, Washington, D. C. Proposed by Mr. Marlatt.

Mr. E. H. Forbush, Malden, Mass. ; Mr. A. H. Kirkland, Malden, Mass. ; Mr. R. A. Cooley, Amherst, Mass. Proposed by Professor Fernald.

Mr. F. W. Urich, honorable secretary Victoria Institute, Trinidad, and Trinidad Field Naturalists' Club.

The annual address of the President, John B. Smith, was entitled "Entomological Notes and Problems." He drew attention to the fact "that differences in results obtained by farmers do not always argue ignorance or carelessness, and that insects or insecticides may vary, either in resisting power or in effectiveness, in different localities, and that we must not hastily conclude that what answers in California will be equally effective in New Jersey, nor that the conclusions based upon the most careful experiments made in New York can be accepted unquestioned in Idaho," and stated, "that there are factors not yet understood by us that should make us cautious in recommending too positively or hastily measures based on results reached in localities different from our own, and on the other hand should make us very chary in condemning work done by a confrere because our results do not agree with his."

"The day of testing insecticides is therefore not so nearly over as has been sometimes thought, and we owe it to our constituent, where his results do not agree with our expectations, to test the matter under his conditions before deciding him incompetent ; and it does not need the distance between the Atlantic and Pacific to make a difference in condition. Results obtained annually by dozens of farmers in New Jersey seem absolutely

* Through the kindness of Mr. L. O. Howard, Entomologist of the Department of Agriculture, Washington, D. C., we are enabled to give the following account of this interesting meeting.

unobtainable by most careful experiments made in New York ; while I have this season proved, much to my dissatisfaction, that the reverse may be equally true, for I can not secure the results in actual practice with bisulphide of carbon against cabbage maggots which Mr. Slingerland obtained in his experiments. Yet Mr. Slingerland undoubtedly recorded only what he found, and sooner or later the reason for the failure in New Jersey will be discovered. Each worker must therefore study his own field most carefully."

He next took up the question of how to control the publication of entomological matter in newspapers in order to prevent the dissemination of erroneous statements, and mentioned the difficulties that he encountered in his efforts to do so. He then referred to the impossibility of keeping track of everything that is published on economic entomology, referring not only to bulletins and reports, but also to the articles published in agricultural journals and newspapers, and asked whether there might not be some feasible way of interchanging among the members of the Association, records of all articles containing original or useful information. He also suggested that some arrangement should be adopted for the interchange amongst the members of specimens of injurious insects and their work, and also the formation of a central collection of economic entomology.

He then dealt with the subject of legislation against insect pests and referred to the difficulty of arousing public opinion sufficiently in order to secure action. He also dwelt upon the importance of having some kind of inspection of trees and shrubs grown in nurseries before they were sent broadcast over the country.

"Perhaps I have spoken enough of problems and of difficulties—he went on to say—and should mention some of the accomplishments, some problems solved. Unfortunately there are none. Progress there has been in many directions, and of the most encouraging kind, but no striking successes, no epoch-making discoveries. We have not yet succeeded, for instance, in dealing more satisfactorily with grasshoppers ; but it is decided progress to learn that in a single State several hundred 'hopper-dozers' are in use under the direction of the entomologist and that the State has realized the importance and necessity of this kind of work. Our good friend and fellow-member, Dr. Otto Lugger, has certainly succeeded in securing respect for his profession and a reduction of his preachings to practice.

"Chinch bug work continues in a number of States ; but we are not much nearer a final decision concerning the actual value of the *Sporotrichum* as a destructive agent. The chief objection to it seems to be that it requires the intelligent co-operation of the weather to secure the best results, and the weather is notoriously unreliable except in so far that you may count with reasonable certainty that it will not be as you want it.

"In this very State of Massachusetts we have a striking example of a destructive increase of an imported pest—the gypsy moth—and an interesting experiment in the direction of its destruction by the State. There are to be two papers on this subject, I am informed, and there will probably be a discussion on the principles concerned in the matter of dealing with imported pests. But I will take the liberty of offering just a few remarks here, not on the methods employed, but on the general principles involved. Under our scheme of government the individual States jealously reserve to themselves all matters of internal interest, and the Federal authorities are excluded from all save a fairly well-determined class of subjects. But no State seems to owe any duty to its neighbors, and Connecticut cannot force Massachusetts to protect it from an invasion by any Massachusetts pest, nor can it claim damages for any resulting injury. Each State is thrown upon its own resources for the protection of its own citizens. Connecticut took no steps to restrain the spread of the pear midge, and New York and New Jersey, though they are sufferers by the neglect, can make no complaint ; but these States have in turn left the matter to individual effort, and Pennsylvania and Delaware, when their turn comes, will most likely adopt the same policy of non-interference. There is nothing, in other words, to prevent the spread of this insect over the entire United States except the limitations imposed by nature itself. Just what they are remains to be seen.

"Massachusetts owes no duty to other States to protect them from the gypsy moth. She owes a duty to her citizens only, to the extent that her citizens in a legal way them-

selves determine by their own representatives. If in protecting themselves they protect their neighbors also, they deserve no credit for this result and have no claim for assistance. Yet it is a very grave question whether Massachusetts is not entitled to the assistance of her neighbors or of the general government in her efforts to exterminate this insect. I am offering no opinion as to the possibility of extermination—I have expressed myself both ways and cannot find another—but is not this really a matter of national importance, and should not the national government have certain duties or powers in cases of this kind?

“It is said that nothing is wholly bad, and so I find it possible to see a good feature even in the continued spread and increased injury caused by such imported pests as the elm leaf-beetle. I believe that this creature has done more to arouse public interest in economic entomology than any other single factor for many years past. Our cities are the centres of public interest nowadays, and our metropolitan press voices its expression. Insect injury to agricultural products rarely excites more than a passing curiosity, but the depredations of shade-tree insects in streets, parks, or near-by country roads, and on the grounds surrounding country houses attract attention immediately and produce loud and continuous complaints. The press is interested, and through it the public, while those most vitally affected, the owners of fine shade trees, are induced to examine into a question which they would otherwise have considered as of not the least practical interest. It is from this point of view that I welcome the recent great spread and increased injury from this elm leaf-beetle. City and town authorities and village improvement societies have taken up the matter, have inquired into it, and have even made some more or less successful experiments; and these, if continued, as they must be from the nature of the case, will produce an increased interest in and appreciation of economic entomology. Insecticide machinery and a knowledge of the application of remedial measures against the more common pests will be required of each park department and its employees, and the entomologist will be as important an officer as the landscape gardener. * * *

“I have noted an increasing tendency of late to attempt the control of insect pests by methods of cultivation or farm practice, and this, in my opinion, is much to be commended. There are periods in the life histories of many insects when they can be easily reached if we only know how, and where resort to some simple bit of field practice may prevent injury. A good example of this is seen in the practice of cutting close to the surface all shoots of blackberry about June 20 to prevent injury from the *Agrilus ruficollis*. All the eggs have been laid at that time, and the new shoots will be exempt, of course, while the larvæ cannot develop in those that have been cut down and will die. The whole matter seems so simple now, and yet it is less than two years ago that this was practiced almost simultaneously in New Jersey and Ohio.

“Preventing injury from the larvæ of *Melittia ceto* in late squashes by planting summer varieties upon which the eggs are laid and in which the larvæ are afterwards destroyed is another method which has been worth many hundreds of dollars to farmers on Long Island and in New Jersey.

But there is yet much to be done in this direction, and I am convinced that in the future “circumvention” will be practised in many cases where we now use poison. Farm practice, using this term in its widest sense to include the mechanical treatment of land, selection of fertilizers, date of planting and harvesting, rotation of crops, etc., will in time give us control of many injurious species which at present seem beyond our reach. It must be our aim to ascertain as far as possible the circumstances least favorable to the development and maintenance of the troublesome species, and then our attempt must be to produce just those conditions.

“We should, I think, whenever possible, lay great stress upon the importance of destroying crop remnants when they are no longer needed. For instance, cucurbit vines are usually left on the ground after all the crop is off, affording abundant opportunities for the maturing of *Anasa tristis*, the melon lice, and other pests. Removing them when no longer needed and destroying will save much trouble during the year following. Systematically burning potato vines as soon as the crop is harvested will prevent all

danger of injury from the potato-stalk weevil (*Trichobaris 3-notata*), and I might cite many other cases were it necessary. We should also set out the advantages of winter work against many kinds of insects in orchard, vineyard and garden, and the desirability of destroying by fire everything that comes under the head of rubbish. Especially against certain kinds of hemiptera this sort of work would prove effective, and fire, judiciously used, can be made a valuable friend. So, much of the pruning should be done at this season, where the character of the plant warrants it, and if the cuttings be burnt many ova of insects will be destroyed. But I am telling you old facts which you do not care to hear. My purpose was not to offer them as information, but to urge their more forcible presentation to the farmer, and to indicate that in my opinion the future development of our dealings with insects will be along this line. * * *

“On the whole, I may repeat, we have rather cause for congratulation than otherwise. Our favorite branch of scientific investigation has made continuous and healthy progress; we have firmly established the reason for our existence and have impressed the general public with a dawning of appreciation for the work we are doing. Our session here will, I doubt not, improve our standing, and will at all events be profitable to those taking part.”

Professor Fernald discussed interstate entomological problems with particular reference to the gypsy moth and the attempts to get the work against this insect undertaken by the General Government. He referred also to the difficulties arising from the conflict of interests of different States.

The first paper on the list, “Notes on Insecticides,” was read by Mr. C. L. Marlatt, in which he described at length a series of experiments that he had made in order to thoroughly test the various apparatus that had been designed for spraying with kerosene oil and water, the results of which were not entirely satisfactory. He then treated of various insecticides, viz., soaps, arsenate of lead, cyanide of potassium and arsenite of copper.

AFTERNOON SESSION—AUGUST 27, 1895.

A paper by Mr. H. E. Weed on “Some Experiments with the Knapsack Kerosene Attachment,” was read in his absence by Mr. Davis. In it the writer set forth the advantages that are claimed for the use of this mechanical mixture of kerosene and water over the familiar kerosene emulsion. It was followed by a paper by Mr. Clarence M. Weed on “A Modification of the Kerosene Knapsack Sprayer,” in which he reported a series of tests of the knapsack sprayer with kerosene attachment, showing that the principal machine now on the market is unreliable in its present form. The chief source of error appears to be due to the continual differences of level in the kerosene and water tanks. To avoid this a kerosene attachment had been made at the New Hampshire Experiment Station, and was exhibited, of the same height as the water reservoir and holding one-tenth as much. A stopcock with a single hole one thirty-second of an inch in diameter connected the kerosene reservoir with the pump. By this arrangement a fairly constant spray having nine per cent. of kerosene in it was obtained. The opinion was expressed that to get successful results we must abandon the idea of having a large range of variation in one combination of reservoirs—*i. e.*, in expecting to get either a five per cent. or a thirty per cent. emulsion by turning a stopcock at a less or greater angle. The author believed that the kerosene sprayer was capable of great improvements along the lines indicated, and thought it too great an advance in methods of insect warfare to be lightly abandoned.

The following communication on “Spraying Without a Pump,” by Mr. J. M. Aldrich, was in the form of a letter to the Secretary, accompanying a working sample of the apparatus. The apparatus itself and the manner of working it were described by the

Secretary with the aid of blackboard illustrations. The following is an abstract of the letter :—The spraying device which was suggested by the author to the association last year was again presented to call attention to two changes in the machine from the first idea. First, it is necessary that the stream from the hydrant enter the lance within rather than beyond the entering point of the insecticide ; second, the Nixon nozzle is entirely inapplicable to this form of apparatus, for the reason that it chokes the flow so as to destroy the suction in the insecticide tube. No nozzle has yet been devised free from this objection, except a plain deflector tip. The author is aware that a deflector does not give so good a spray as can be obtained in other ways, and hopes yet to overcome this objection.

The spraying device consists of a sort of lance, forked at the base. One fork connects with a hose to a hydrant or water supply under pressure, and the other with a tube leading into the vessel containing the insecticide. Both forks are provided with stopcocks. The suction caused by the passage of the water through the lance induces a flow through the fork and hose leading from the insecticide.

To use the apparatus, attach to an ordinary lawn hose by the large coupling. Turn on the city water, and it will be at once perceived that there is a strong suction through the small or insecticide tube. Put the end of this in a pail of water or kerosene, and, in the case of the apparatus experimented with, sixteen per cent. of the total discharge comes through it, the stopcock being wide open. By partly turning off the stopcock the proportion of kerosene can be reduced at pleasure, and the percentage may be indicated by graduations on the back part of the stopcock.

For Paris green, make up a pailful at the rate of one pound to twenty-five gallons of water, and when drawn through the machine it will be diluted at the eight per cent. kerosene gauge mark to one pound to 150 gallons and thoroughly mixed.

The device was experimented with by the inventor with a water-pressure of seventy-five pounds, which was inferred to be an average for city water.

No claim to novelty for this device was made except in the application. The principle is the same as that in the "jet pump" used for draining out barges, cellars, etc.

If the instrument deserves any name, it is suggested that it be called the Idaho jet sprayer.

Discussion of the foregoing papers followed. Mr. Southwick had canvassed the question of spraying from hydrants in his work in Central Park, New York, but had found it impracticable on account of the insufficient pressure of the water and the small number of hydrants. He said he was devising a steam pump which he hoped would give greater satisfaction than any apparatus hitherto used.

Mr. Davis suggested that any apparatus dependent on a constant water supply, as of hydrants, would be more feasible in the West in connection with irrigation plants.

Mr. Howard remarked that a stream produced by a pressure of seventy-five pounds to the square inch, mentioned by Mr. Aldrich as obtained from his hydrants, was quite sufficient to kill insects, with the exception of scales, without the addition of oil.

Mr. Lintner asked if the oil and water mixture referred to in the various apparatus described in the papers could be properly considered an emulsion.

Mr. Marlatt said that an oil emulsion was merely the breaking up of the oil into minute globules in the emulsifying agent, and that on this basis the water and oil mixture, as long as permanent, was as properly an emulsion as the kerosene and milk mixture. He referred also to the fact that emulsions are often made with solid ingredients, as powdered lime.

Mr. Southwick referred to a nozzle which had lately come under his observation, which effects the mixture of the insecticide element with water at the moment of spraying. He had not yet experimented with it.

Mr. Marlatt said that from the description Mr. Southwick undoubtedly had in mind the Gillmore nozzle (to which Mr. Southwick assented), and said that Mr. Gillmore was at the Department, and some very careful tests were made with this nozzle with various insecticide agents. The character of the nozzle and the practical objections to its use were then pointed out.

Mr. Forbush said he knew of a similar principle at one time employed by a fire apparatus company to mix a fire extinguisher with water at the moment of spraying.

Mr. Smith said it was very encouraging to see such decided interest taken in the manufacture and improvement of machinery for the application of insecticide mixtures. He was of the opinion that the origination of new devices and the work of perfecting old ones or overcoming mechanical difficulties may be safely left to manufacturers, whom he had always found very ready to adopt suggestions in the matter of the betterment of apparatus. In this connection he referred also to the adoption by the Climax Pump Company of an improvement in the kerosene knapsack sprayer suggested by Mr. Goff. His experience with the improved knapsack sprayer, he said, corresponded very closely with that detailed by Mr. Marlatt.

Mr. Marlatt, referring again to the device suggested by Mr. C. M. Weed, pointed out that while the arrangement of the kerosene and oil reservoirs suggested by this author would probably obviate several of the difficulties, still an important objection, arising from the oil escaping into the water chamber during the action of the pump or immediately thereafter, was not corrected by this means, although possibly rectified by the combination suggested by Mr. Goff in a communication in Garden and Forest of April 10, 1895.

Dr. John B. Smith read the following paper :

“ RAUPENLEIM ” AND “ DENDROLENE. ”

“ Raupenleim ” and “ dendrolene ” are both crude petroleum products of a butter-like consistency at ordinary temperatures and becoming only slightly softer at high temperatures. The raupenleim is a German product, very dark in colour, with a tarry odour and probably mixed with some tar preparation. The American product is brown in colour, almost without odour, and without foreign admixture to disguise its character or give it a specific smell. Raupenleim is largely used in Germany to protect trees from the attacks of certain insects and to prevent their being injured by stock or deer during the winter. The materials were tested comparatively for the purpose of preventing borers from attacking fruit trees, and if possible to prevent their issuance when already under the bark. Both materials can be readily applied with a paddle or trowel and distributed by means of a stiff brush so as to make a tolerably even coating. Experiments showed that it did not injure even young shoots where applied to the bark only ; but where buds or growing tissue were covered it killed the buds and shoots by choking the stomata. A young tree set out in 1894 was covered from the surface of the ground to the buds without detracting from its vigour during the balance of the season. It was applied upon an orchard of pear trees infested by the sinuate pear borer and both materials prevented oviposition. The raupenleim absolutely prevented the issuance of all the beetles maturing under the bark. The dendrolene did the same where thoroughly applied. The raupenleim has a tendency to harden on the surface. This is a good thing where it is intended to prevent beetles from issuing from the trees, but a bad thing where it is intended to prevent insects from crawling up the trunk. The dendrolene becomes very soft at high temperatures without running. This prevents insects from crossing it ; but where it is applied thin it does not always form a barrier to insects emerging through the bark. Its application is recommended as against the fruit bark-beetle (*Scolytus rugulosus*), which can not emerge through it when already in the tree, and can not enter the bark protected by a coating. It was also tested against peach borers, and both materials proved effective.

It was stated by the grower conducting the experiments that the dendrolene killed the borers that were in the tree when it was applied, while the raupenleim did not. This fact may have been accidental and is not to be expected under ordinary conditions. The material is recommended for application to fruit trees to prevent attacks of round and flat-headed borers, and also wherever it is desirable to prevent insects from ascending or descending the trunk. A broad band, put on thickly, is recommended against the codling moth, and, in cities, against the white-marked tussock moth and the bag worm. It is suggested that applied on trunks on which insects like the pear psylla hibernate it will destroy these insects by preventing their coming out in the spring.

The cost of the raupenleim, free on board in New York city is, for twenty five pounds, \$3.75 ; fifty pounds, \$6.75 ; one hundred pounds, \$12.75 ; barrel, from 250 to 275 pounds net, about \$25. Dendrolene is supplied free on board at six cents a pound in New Brunswick, N. J., in lots of twenty-five to fifty pounds, and at 5½ cents in lots of one hundred pounds and over. The material can be washed from the trunks of the trees if desired by a strong potash mixture, say one pound of potash in a gallon of water. As the substance is a mineral product, it does not become rancid.

In answer to a question as to the composition of the lime, Dr. Smith stated that it was chiefly, if not entirely, crude mineral oil.

Mr. Southwick read extracts from a letter from agents for an imported insect lime, which were very extravagant in statement.

Mr. Fernald said he had experimented with the lime against the spring canker-worm, in conjunction with other experiments with printer's ink, the latter applied on paper bands, and banding the trees also with cotton, two or more bands being placed on the same trunk. Very few worms passed over the cotton bands, considerable numbers over the ink bands and a few over the lime. The larvæ chiefly effected their passage over the latter on cool mornings, which indicates that very diverse effects may be expected in different climates. He thought that of the three substances experimented with the imported or raupenleim gave the best results.

Mr. Howard asked what period of the year was included in the five months during which the lime was on certain trees.

Mr. Smith replied that they were the five months immediately preceding the middle of July.

Mr. Lintner suggested that the lime be so thinned down that it could be sprayed, to facilitate application.

Mr. Smith stated that this thinning would be especially desirable for work against scale insects, but that even when considerably thinned it could not be sprayed through an ordinary spraying nozzle.

Mr. Forbush said he had not his notes with him and therefore could not give in detail his experience with lime, which had been very extensive. He had used the raupenleim and an American material, Menzel's brand. He had found considerable difference in imported material obtained in different years. Sometimes it had proved very unsatisfactory and he had discontinued its use for other methods which he deemed more advisable for his work. He said that some insects can cross the lime, but when it is warm, and especially on sunny days, it is a nearly perfect barrier. On cold days, and particularly in stormy, rainy weather, insects can pass it with comparative ease. On smooth bark it will run somewhat, and will also crack or break, especially on rough-barked trees. German authors, he stated, claim that no injury results to the trees from its application, and his own experience was confirmatory of this. The only injury he had noticed came from the scraping prior to the application of the lime or injury from the lime as a result from such scraping of the bark. On dusty streets the lime soon crusts over and may be crossed by insects, and pine needles adhering to it produce a similar result. It is claimed by some that limed trees are not frequented by birds, but this idea was not confirmed by his own experience. He had used various machines and various devices had been constructed by the commission for the application of the

lime. The necessity in cities or public parks of applying the lime at considerable heights on the trunks to prevent contact with it on the part of passers-by rendered many machines for its application impracticable for his purpose, and he had been compelled to employ chiefly paddles and trowels. European machines were found to be crude and somewhat unsatisfactory. He said that in Europe the lime was employed also as a coating for egg masses to prevent the escape of the larvæ. The objection to this was that such egg masses were very apt to be broken open by squirrels and the larvæ thus enabled to escape at the proper time. He thought lime would be of value, particularly against the canker-worm. He had found in certain instances that after lime had been exposed on trees during summer and winter the following spring it was still of a consistency to be of service.

Mr. Smith said that the dendrolene referred to in his paper is entirely without odour, whereas the European lime smells very strongly of tar. He was of the opinion that this odour was given to the European product to conceal its true composition.

Mr. Davis had tried wool bands with parallel experiments with raupenleim against canker-worms, and found the latter successful in every instance; but this could not be said of the wool bands. He had found lime impracticable against cut-worms, many of them crawling over it in the cool of the evening; and it had not proved entirely satisfactory against the peach borer, as the borers frequently emerged in spite of the coating of lime.

Mr. Smith said that this would be very probably the case if the application were made to the peach after the larvæ were in the tree, but that the application would be more successful if used to deter the moth from ovipositing.

Mr. Southwick said that in his experience he had found the tussock moth larvæ so numerous that they had been able to crawl over the lime on account of mere numbers.

Mr. Smith said this would not occur in the case of young larvæ.

Mr. Forbush said larvæ would bridge over any band when very numerous, and that such a result could only be prevented by visiting the bands and collecting at frequent intervals the larvæ accumulated beneath.

Mr. Smith said that the American product referred to in his paper was less affected by extremes of temperature than the European lime. He was convinced that in insect lime we have a valuable means of defence against many insects, but that there was room for considerable improvement at present.

Mr. Forbush said that while he had discontinued it for other reasons, he believed that there were great possibilities in the proper use of insect lime.

Mr. Fernald, referring to the Russian lime, said that all the material probably came originally from Germany.

Mr. Smith stated that the constituent elements of the lime very possibly came from the oil regions of Russia.

Mr. Marlatt said the Department of Agriculture had received samples of this raupenleim, and called attention to the very strong similarity between this substance and ordinary axle grease, both in odour and physical qualities, and suggested that the composition of the lime was probably very similar to that of axle grease. He said that in applications to trees as against scale insects, and wherever applications were more generally made than by mere banding, the after effect on the tree would probably be disastrous, although it might not develop for some months. Experiments with other oils on trees gave a strong probability in this direction.

Mr. Smith said the insect limes would very probably turn out to be material similar to axle grease. The dendrolene referred to by him was a Standard Oil Company's product, and would very likely appear under different names as coming from different houses, although all would obtain their supply from the Standard Oil Company. As applied to old bark, which had no vital function, subsequent injury need not be feared.

Mr. Howard referred to the press reports of the loss by a Kentucky orchardist of a thousand valuable peach trees from the application of linseed oil, with other ingredients, as a preventive to the borer. The recommendation which led to the application was charged to the Department of Agriculture, this charge proving, however, by the man's own admission, to be unfounded.

Mr. Davis remarked that a similar remedy had been recommended by the United States Pomologist to the fruit growers of Michigan.

Mr. Smith called attention to the necessity, in reporting results, of giving adequate explanations, instancing the danger of confusion in the use of the term "emulsion" arising from the different kerosene emulsion formulas used as a case in point.

Mr. Forbush gave further results obtained by the commission in the use of lime against the gypsy moth and against the tent caterpillar, all indicating the value of lime. He also described the method of clearing out underbrush as a means of starving out the larvæ.

Mr. Howard said the starving-out plan was the one principally relied on in the work against the nun moth in Austria. Trees of considerable size were banded with the insect lime to prevent the ascent of the larvæ, and all low-growing vegetation was then absolutely destroyed and the larvæ perished for want of food. He further said that there are certain species of plant lice which descend the trunks of trees in autumn and ascend again in spring, against which bands of lime could be used to advantage. This would be particularly the case with the species common upon the tulip tree.

Mr. Lintner, referring to the difficulty of preparing a good emulsion, suggested the advisability of someone's undertaking the preparation of the emulsion as a merchantable article, spreading its benefits to the general public, who were not sufficiently skilled or equipped to undertake its home manufacture.

Mr. Smith said that some patented insecticides very closely imitated the kerosene emulsion, but were more expensive than their cost of manufacture warranted; but he agreed with Dr. Lintner as to the desirability of having the standard emulsion on sale.

Mr. Howard said that where an appropriation was available the superintendents of parks might make the emulsion and distribute it free of charge, as had been done in New Haven.

Mr. Southwick read a paper entitled "A City Entomologist and Insecticides."

The paper was discussed briefly by Messrs Smith and Howard.

Mr. Smith, discussing the work of *Scolytus*, stated that they normally attack weakened or unhealthy trees, and that a vigorous tree would require very considerable work by *Scolytus* to seriously injure it.

Mr. Lintner said he understood from Mr. Davis that the trees were thus diseased and unhealthy.

Mr. Davis replied that some of the trees were thrifty and others lacked vigour.

Mr. Rolfs referred to the great numbers of *Scolytus* which followed the disastrous frost of last winter in Florida, causing great alarm among fruit growers. He said, however, that the trees attacked were such as were greatly injured by the frost and would probably have died anyway from the effects of the latter, and that the beetles were always present though rarely injuriously abundant.

Mr. Howard said that it is well known that in the absence of sickly trees *Scolytus* will attack healthy and vigorous trees, and that the present large numbers of *Scolytus* are therefore a constant menace.

Mr. Smith said he had been informed by Mr. Schwartz that the beetles will enter healthy, vigorous trees, but are unable to successfully propagate in them.

Mr. Lintner said that Professor Peck had found them attacking perfectly healthy spruces.

Mr. Smith, referring to the climbing cut-worms, said that he had been frequently called on to determine for correspondents moths described as having been bred from climbing larvæ. He had received several such from Mr. Slingerland. He questioned if they did not adapt themselves to differing conditions, sometimes assuming the climbing habit, while perhaps normally working on the ground.

Mr. Howard reported that the species *subjuncta* and *scandens* had been repeatedly sent in this year as climbing cut-worms.

Mr. Sirrinc asked if all cut-worms did not climb as young larvæ, giving his experience with cabbage cut-worms as sustaining that view.



Fig. 34.

Mr. Smith said that this is the habit of *Carneades messoria* Fig. 34, on onions. In this connection he urged the value of personal observation to impress one with the true significance and importance of the working habits of insects. In illustration of this he referred to his having recently witnessed a grasshopper invasion in the west, which had brought to him a realization of the possibilities of this insect to which before he had been a stranger. He said also that the Hessian fly, commented on by Mr. Davis, had proved very much more numerous in New Jersey this year than in years recently passed.

Mr. Lintner said this fly was also very abundant in western New York.

Mr. Howard said this is distinctively a Hessian fly year, and that the division had recently issued a circular to facilitate answering the numerous inquiries received on the subject.

The following paper by Mr. Chittenden, was read by Mr. Sirrinc :

HERBIVOROUS HABITS OF CERTAIN DERMESTIDÆ.

The Dermestidæ, as is well known, feed chiefly upon dried animal substances. Certain species, however, are reported to have injured vegetable material, and a few recorded instances of damage of this character are cited. Until very recently the various species of household Dermestidæ had not been suspected of actually breeding in other than animal substances, but the experiments of the writer indicate that they subsist also on a vegetable diet.

The larva of *Attagenus piceus*, or black carpet beetle, was received in cereals from various sources, and was finally brought to the attention of the writer in such manner as to lead to a suspicion that it might feed, at least occasionally on vegetable substances. Adult insects were confined in a jar of flour and meal, and their progeny were found to thrive upon this material. This species was also found to breed in timothy seed, and incidental mention is made of serious injury to bolting cloth by it in a mill at Georgetown, D. C. A brief review of the history of this insect in America, where it has been known since about 1806, is given, and instances of its reported occurrences in granaries are cited.

Trogoderma tarsale Melsh, a common museum pest, was found to infest flaxseed, castor beans, and cayenne pepper that had been on exhibition in the museum of the United States Department of Agriculture, the larva being reared from the egg deposited in these substances and the adults having been bred from other larvæ feeding on them.

An unknown and evidently recently imported species of *Trogoderma* was stated to be living in flaxseed, castor beans, and silk worm cocoons with the above-mentioned species, and in red-clover seed. This species is believed to have been introduced at Washington in the silkworm cocoons. It has been taken in New Mexico and will probably be found to have established itself elsewhere in the United States.

Anthrenus verbasci Linn, our most abundant insect cabinet pest, was reported as occurring in "middlings" and spoiled flour, and the fact mentioned that at the time of writing larvæ placed in flour were feeding upon it, from which it was judged that they would in due time reach the adult condition.

In conclusion it is stated that in the case of the *Attagenus* and *Anthrenus*, these insects were probably first attracted to granaries by the presence of weevils and other grain insects, and that the graminivorous habit is an acquired one. The presence of *Trogoderma* in oil seeds and red pepper, however, admits of no other explanation than that of the absence of animal food, and shows a wonderful adaptability to unnatural environment.

Mr. Howard said that the buffalo moth does not occur in Washington, its place being taken by *Attagenus piceus*. He asked for the experience of others as to the former insect to determine its southern extension. *A piceus*, he said, is not so troublesome as the buffalo moth but is yet a serious pest. In answer to a query from Mr. Davis he gave a brief description of the larvæ of the two species.

Mr. Lintner, referring to the popular designation of the insect as the "buffalo moth," said that he had often urged the discontinuance of the use of this misnomer and thought an effort should be made to secure popular acceptance of a more appropriate common name for this species. He thought it not so strange that *Dermestidæ* fed on vegetable material, since many species having an altogether animal feeding habit in the larval state are vegetable feeders as adults, instancing the feeding of larvæ of various species on woollens and other animal products, the adults of which feed on pollen.

Mr. Fernald discussed the use against these insects of inflammable and explosive insecticides in connection with its bearing on insurance policies and was inclined on this latter account, not to recommend them. He gave the method of controlling the pest followed with success by his wife, as follows: (1) Before bringing flowers into the house thoroughly shake them to dislodge the beetles. (2) Regularly collect and destroy the beetles which emerge and gather on the windows of the house during the months of March and April. (3) Carefully treat the carpets on the upper floors of the house, as the beetles commonly enter through the upper windows, and these carpets act as traps, getting the first and the bulk of the invasion.

Mr. Davis said his wife had been unsuccessful in the use of similar remedies.

Mr. Rolfs said that the work of the carpet beetle was much worse in the South than in the North, but he did not know the species. He used carbon bisulphide or cyanide gas, preferring the latter. If used with caution he thought neither of these substances dangerous, and their use was especially desirable in connection with herbariums.

Mr. Lintner said that he ordinarily recommended kerosene, which he thought more suitable than gasoline. Before laying new carpets all the grooves should be carefully filled with cement or plaster, and the carpets should be left loose at the borders to facilitate frequent investigation. The use of tarred paper was also advisable. He had found the following trap method valuable; Remove all woollens from rooms or closets and scatter about them bits of red flannel, which is a very attractive bait for the *Anthrenus*. The beetles thus attracted are afterwards collected and destroyed. Referring to Mr. Fernald's statement regarding the method of entrance of the beetles from flowers out of doors, he said that this is a common experience and that they commonly enter houses through the upper windows and appear first in the carpets of the upper rooms, thus making their reappearance after having been exterminated.

Mr. Fernald discussed the subjects of the relation of colour in woollens or carpets to infestation by the buffalo moth, and said that it had been carefully investigated by his former assistant, Mr. Lounsbury, as to the attractiveness both of particular colours and different dyes to the beetles. The information was sought from various sources, including factories for the manufacture of carpets and rugs. The conclusion arrived at was that colour is not an important factor—at least the beetles do not confine their attacks to

particular colours, though showing a preference for the greens. He thought it more likely that the preference exhibited by the beetles in certain cases was due rather to the mordant employed.

Mr. Howard said that the best remedy and the one which he now always advised, was to abandon the use of carpets altogether.

Mr. Smith had used the method suggested by Mr. Davis and had also employed gasoline. He had not found anything in insurance policies against the use of this or like substances in small quantities, but he was always careful to urge the greatest caution in the use of inflammable substances. He gave, by request, certain experiences which he had had with the use of bisulphide of carbon in the National Museum, a rather serious explosion having in one instance occurred from the ignition of this substance by the heat from a steam radiator, while there was another equally startling case of the ignition of the substance in a large box, resulting from a spark having been struck off from a nail in fastening down the lid of the box in which the bisulphide had been placed. In the latter case the box exploded and the negro laborer was either thrown a distance of some feet or had leaped a considerable length under the excitement of the moment.

Mr. Howard asked Mr. Taylor, a visitor present, who is engaged in the manufacture of bisulphide of carbon, if he knew of any cases of accident from the use of this substance.

Mr. Taylor replied that he knew of but one case of serious results, and that was where an explosion had resulted from a stroke of lightning. He was inclined to think that with ordinary precautions the danger was trifling. He said that the substance will ignite at 220° F.

Mr. Smith said that the radiator referred to by him was not nearly so hot as that.

WEDNESDAY MORNING—AUGUST 28th, 1895.

Mr. L. O. Howard read a very interesting paper on "Some Shade-tree Insects of Springfield and other New England Cities," in which he treated especially of the elm-leaf beetle (*Galerucella luteola*), and the Woolly Maple leaf Louse (*Pseudococcus aceris*), and traced their progress throughout the region referred to.

Mr. C. L. Marlatt followed with a paper on "The Elm-leaf Beetle in Washington," in which he described the methods pursued by the Division of Entomology to protect a grove of elm trees in the grounds of the Department of Agriculture from the ravages of this destructive insect.

Another paper descriptive of the history and injuries wrought by the same insect at Albany, N. Y., was read by Mr. J. A. Lintner, State Entomologist.

A long and interesting discussion followed in which most of the members present took part.

At the afternoon session Professor Fernald gave an extended account of the operations of the Gypsy Moth Commission in Massachusetts. (See 25th Annual Report, 1894, page 67, for a description of this insect, and the methods adopted to keep it in check.) In response to a request Mr. Kirkland, assistant entomologist to the Gypsy Moth Commission, gave a verbal report on the more recent experiments with insecticides conducted by the Commission. He said that no success had been had with insecticides until the arsenate of lead had been devised, and even this, at the rate of ten pounds to 150 gallons of water, effected the destruction of only about fifty per cent. of the larvæ. He described his examination of the alimentary canal of the larvæ, with a view to determining the probable action of the juices contained in various parts of the canal on insecticide substances. He had found the juices strongly alkaline, and of the substances which seemed most likely to be acted upon by an alkaline liquid he had considered the cyanides of different metals to be the most promising. The cyanides of lead, antimony, copper, zinc,

iron, manganese, mercury, etc., were considered. The cyanides of antimony and copper, on theoretical grounds, seemed to promise best. The cyanide of antimony was totally without effect at the rate of 10 pounds to 150 gallons of water. Cyanide of copper was fairly effective, but too expensive for practical employment, three pounds to 150 gallons being with this substance equivalent to one pound of Paris green to 150 gallons of water, or three or four pounds of arsenate of lead to 100 gallons. Even where no practical results seem to have been obtained, as in the above series of experiments, he pointed out the value of the negative results; in that the very fact that the merits of these substances valuable for insecticides is better understood and limited. In connection with the various experiments with insecticides he had occasion repeatedly to emphasize the extreme vitality of the gypsy moth larva and its immunity to the action of poisons.

Mr. Riley discussed the gypsy moth question at considerable length. He said he had always been much interested in the gypsy moth work, and referred to the original conference called by the State Board of Agriculture of Massachusetts, giving an account of this meeting, and of the suggestions made by himself and others as to means of controlling the insect. These suggestions were necessarily based on experiences with our well known common insects having somewhat similar habits, and had no basis in any actual experience with the insect under discussion. He had recommended and believed that the use of the arsenites is one of the most practical and effective means of control. There can now be no doubt, however, that this insect is an exceptional one, and probably can not be controlled by means which are quite effective against other insects, enemies of our trees, having similar habits. Emphasizing the great damage which may be done by this insect, he was convinced that its control and destruction are not only extremely necessary to the State of Massachusetts, but are also of national importance. He had always been in favor of extermination rather than of attempting to limit and control, but he pointed out the very great difficulty of exterminating the species if the work is mainly directed toward the destruction of the eggs, referring in this connection to his early statement in this regard, in which the destruction of the eggs had not been deemed of prime importance. He thought, however, that in this particular he had been too extreme. He pointed out the absolute futility of any efforts at extermination which did not promise complete results. All that he had said in criticism of the Commission had been relative to the operations prior to Professor Fernald's controlling connection with the work. He heartily appreciated the value of the present methods as detailed by Professor Fernald. He felt that if at the outset a supreme effort had been made, with the aid of a very large appropriation, complete extermination of the insect could have been accomplished. He gave a summary of some early work and his criticism of it. He was somewhat inclined to question whether we are now justified in working on the basis of extermination through a State commission, or whether it would not be better to encourage the efforts of private individuals wherever the insect occurred, as is the case with other insect pests. He complimented very highly, however, the present work of the Commission. In discussing the subject of parasites, which had been referred to by Mr. Fernald, he was not inclined to agree with the idea that the aim of the commission at complete extermination detracted at all from the necessity of undertaking the importation of foreign parasites. He said that such introduction could be accomplished at comparatively slight expense and would aid just so much the object of the Commission, pointing out also the greater usefulness of European parasites over native ones if introduced without secondary parasites. This would be particularly evident if his idea of the greater value of the destruction of the larvæ rather than the eggs were conceded.

In illustration of the great weight and value of Professor Riley's ideas on this subject, Mr. Fernald referred in the most complimentary way to the value of his long years of labor in the field of economic entomology, which had resulted in a store of information used and appreciated by all the workers of the world at the present day. He gave some statistics of the injury capable of being done by the gypsy moth in the State of Massachusetts, basing his deductions on the value of farm products and the estimated value of forest and shade trees (Mr. Lintner interjecting in the latter connection that the Saratoga elms were insured by the State at \$500 each). Taking the probable injury from

this moth as a basis, he pointed out that a comparatively trifling tax only would be necessary to raise a sum sufficient to control the pest, and was very strongly of the opinion that the work of the Commission should be upheld and continued.

Mr. Howard said he was familiar with the work of the Commission and had gone over the territory and examined the methods of procedure in detail somewhat recently, and was convinced that anyone, seeing the operations and the results already reached, would be impressed with the fact that the work is now being done in the best possible way and according to methods which are most likely to accomplish the ultimate extermination aimed at. He offered a resolution regarding the work of the Commission, which was subsequently acted upon by the Association.

Mr. Lintner said he had been one of the first called to inspect the work and the conditions of the work, and had been deeply impressed with the amount of exertion necessary and the difficulties of successfully prosecuting it. He also had been most favorably impressed with the value of the methods at present employed. Whether ultimate extermination would prevail or not was at present, of course, merely a matter of opinion, but he was convinced of the necessity of continuing the work on the basis of extermination rather than mere control.

The next paper was read by Mr. Lintner on the striped "Cottonwood Beetle" in which he drew attention to the threatened destruction of the basket-willow industry of Onondaga and some other counties of western New York, from the ravages of an insect which has long been known as the striped cottonwood beetle, *Lina scripta* Fabr., but which hitherto has not been regarded as injurious. After describing the insect and its habits, and giving an account of the willow industry and its commercial importance he related the methods which had been made use of to control the insect and especially drew attention to a mechanical contrivance, called a "bug catcher" which had proved very effective for the collection and destruction of the beetles.

Mr. Webster read a somewhat technical paper on the probable origin of the genus *Diabrotica*. This was followed by a paper by Mr. Hopkins of Morgantown, West Va

ON THE STUDY OF FOREST-TREE INSECTS.

The study of the insects affecting forest growth, from an economic standpoint, is in many respects a unique branch of economic entomology, which should in our opinion be designated by the term "forestry entomology."

The importance of advancement of knowledge in this particular branch of science may be inferred from some references to the character of insect injuries to forest growth; to estimates of the amount of damage and the annual pecuniary loss occasioned by such injuries; to the limited knowledge of this class of insects, and to the possibilities of preventing a large per cent. of the loss by the adoption of simple, practical methods of combating the pests.

CHARACTER OF INJURIES.

The injuries to forest growth may be separated into two classes, those affecting the living plants and those affecting the dead or dying plants. Of the former we have injuries to the foliage by leaf-eating, leaf-mining, sap-sucking, and gall-making insects; to the twigs and branches by sap-sucking, twig-mining, bark and wood boring insects; to the trunk by bark and wood-boring, and to the roots by wood-boring, bark-boring and sap-sucking species; the effect of the injuries thus caused upon the living plant being either destructive or detrimental to its growth or usefulness.

The injuries of a destructive character are those caused by insects which occur in sufficient numbers and make their attack in such a manner as to destroy or weaken the vitality of the tree sufficient to be the primary cause of its death.

The injuries of a detrimental character are those which are detrimental to the health, perfect growth, or future usefulness of the tree or its product, but do not cause its death.

Of the injuries affecting the dying and dead trees we find, as among those affecting the living, some which are of a destructive character, while others are simply detrimental. The destructive injuries are those caused by wood-boring insects, which render the wood worthless for any practical use to man. The detrimental injuries are those which produce defects in the wood and hasten the decay of the affected parts.

CHARACTER AND EXTENT OF DAMAGE TO FORESTS BY INSECTS.

Few persons who have not given considerable thought to the subject realize the serious character of insect depredations upon our forests and forest products. This is evident from the fact that the subject is seldom discussed at the meetings of forestry associations and is rarely referred to by writers upon forestry economy in this country.

If we were to assert as our belief that the annual damage and loss occasioned by insects to owners of forest and forest products in the United States was greater than that caused to the same by fire, few persons, if any, would believe that it could be possible. Yet when we come to consider the varied losses resulting from insect depredation, both in a destructive and detrimental manner and in the general influence of their work upon the forest economy of the country, we believe that such an assertion would not be far from correct.

The pine and spruce killed by bark beetles over vast areas in New England and in the Southern States within the last few years has caused an enormous loss of valuable timber; yet this is only a small portion of the damage to timber by insects. That caused in oak by the oak timber worms (*Lymexylon sericeum* and *Eupsalis minuta*), the Columbian timber beetle (*Corthylus columbianus*) and the carpenter moths of the family Cossidæ, to the chestnut by the chestnut timber worm (*Lymexylon sericeum*), and to the tulip and other kinds of timber by the Columbian timber beetle, all of which attack living trees, will equal that caused by many forest conflagrations. Then when we come to consider the damage to the wood of dying, dead and felled timber, and the work of destruction only begun by fire and completed by wood-boring species, it appears to us that the damage caused by insects is at least equal to that caused by fire.

There is also another feature of the question, and that is in reference to the effect of the detrimental and destructive ravages of forest insects upon the forestry economy of the country. Owing to the large amount of timber destroyed and rendered defective by insects, it is necessary for the manufacturers to cut over a larger area than would otherwise be necessary in order to supply the demand for the best grades of lumber and other timber products. According to a statement by Hon. J. Sterling Morton at the last meeting of the American Association of Agricultural Colleges and Experiment Stations, the area cut over every day in this country to supply the demand for forest products is 30,000 acres. From our observation in the lumber regions of West Virginia it would indicate that at least ten per cent. less timber might be cut each year for this purpose were it not for the detrimental ravages of insects upon the standing and felled timber. Therefore, in this item alone the annual loss to the country and to the manufacturer is enormous, for it must be remembered that a large per cent. of the defective lumber is manufactured and disposed of at a loss to the manufacturer, and is often the cause of serious loss to the consumer.

No accurate estimates of the pecuniary losses caused by forest insects can be made. Yet with the knowledge gained on the subject from recent investigations of the ravages of forest tree insects, from correspondence with lumber manufacturers upon the subject, and reference to the statistics of forest products, we feel justified in presenting some figures which will at least indicate the extent of the loss.

We would estimate the loss caused by bark beetles of the family Scolytidæ, which have caused the death of pine and spruce trees over vast areas within the last ten years,

at an average of \$5,000,000 per year ; by bark and timber beetles of the Scolytidæ family causing defective wood in felled timber, \$1,000,000, and by the same in timber injured by fires and other causes, \$1,000,000 ; by the Columbian timber beetle to standing and living timbers, an average of \$1,000,000 per year ; by the oak timber worms and the carpenter worms to the different species of oak, an average of \$2,000,000 per year ; to chestnut timber by the chestnut timber worm, which is rendering one of the most valuable woods almost worthless, an average of \$1,000,000 ; by wood borers of the family Cerambycidæ to standing timber injured by fire, \$2,000,000 ; to felled timber and saw logs by the same kind of insect, \$2,000,000 ; by other wood-infesting insects to standing and felled timber, \$2,000,000 ; by foliage-infesting insects to living forest and shade trees, \$3,000,000 ; by the white pine weevil, plant lice, scale insects, etc., to young forest growth, \$1,000,000 ; by the powder-post beetles (Ptindæ) to forest products, such as seasoned handles, spokes, hoop-poles, building material, etc., \$100,000, and by miscellaneous insects not included in the above estimates, \$3,000,000—a total of \$25,000,000 direct annual loss from insect ravages, which is without doubt a low estimate.

To the above could be added the loss to manufacturers in manufacturing and disposing of defective material, to consumers from the use of the same, and to the indirect loss to the country in the diminished forest area due to insect ravages ; all of which, could it be estimated in dollars and cents, would doubtless equal at least ten per cent. of the total value of the annual forest products of wood material in this country, or about \$100,000,000 annually.

WITH FURTHER KNOWLEDGE ON THE SUBJECT MUCH OF THE LOSS CAN BE PREVENTED.

Probably one of the principal reasons why the economic study of forest insects has been neglected in this country is the prevalent belief that few, if any, practical methods can be found to prevent loss from their injuries. It is true the methods used to prevent loss from the attack of farm, garden, and fruit insects can not, as a rule, be successfully used against those affecting forest growth ; neither can many of the successful European methods of combating forest insects be adopted in this country. But there are simple, practical methods known which, if better understood by forest owners and manufacturers of forest products and properly applied by them, would prevent the annual loss of many millions of dollars' worth of timber.

Some of the results recently obtained and facts determined in the investigations now in progress in West Virginia in reference to the proper time to fell timber to prevent detrimental injury by insects, the utilization of defective material to the best advantage, and the introduction of predaceous and parasitic insects to prevent the undue increase of destructive species lead us to believe that many of the more serious troubles can be easily controlled when we learn more of the habits of the insects and the various conditions, favorable and unfavorable, for their development.

ADDITIONAL KNOWLEDGE AND MORE SPECIAL, ORIGINAL WORK NECESSARY.

Further original research and additional published knowledge are sadly needed in this branch of economic entomology. As compared with the knowledge of insects affecting other economic plants, scarcely anything is known of the life history and habits of even our commonest forest-tree insects. Consequently, the field for original work in forestry entomology is a broad one, rich in interesting material as well as in possibilities of important discoveries.

One of the most important aids toward advancement would be, in our opinion, carefully prepared monographs of the insects known to infest the different economic forest trees, on a similar plan to that adopted by Professor Forbes in his recently issued part of "A Monograph of insects injurious to Indian Corn."

Previous to the undertaking of work of this kind, however, further knowledge is necessary in reference to the food habits of the insects found upon or within the different host plants, and whether they are destructive, detrimental, beneficial, or neutral in their

economic relation to the host. This important information can be best and most reliably supplied by specialists who are studying the different families of insects, and by those who will make a study of the food habits and life history of certain classes of insects which infest forest growth, such as foliage-infesting, bark-infesting, and wood-infesting insects, etc., as special lines of research.

If specialists in these various lines will keep in mind the importance of noting the host relations of the species they collect or observe on forest growth, and will publish the knowledge thus obtained, together with lists of species taken on the various economic forest trees, they will contribute valuable service to the country in the rapid advancement of forestry entomology.

Mr. Webster read the following paper :

THE IMPORTATION AND REPRESSION OF DESTRUCTIVE INSECTS.

BY F. M. WEBSTER, WOOSTER, OHIO.

In the year 1795 my topic would have sounded remarkably visionary and illogical ; not that it was not known that destructive insects were being brought into this country from England and Europe, but that there should be any united action to prevent such importations, or to suppress them after being introduced, would have sounded unreasonable and unpractical. But, come to think of it, can we name a single imported insect that has been repressed, or, in fact, has been seriously impeded in its diffusion over the country, by any systematic obstacles placed in its way by the action of man? Is it not nearer the truth to say that we have, as a people, assisted this sort of immigrants, both in reaching this country and in getting inland as fast as possible after they had landed? Our entomologists have increased in numbers and efficiency to deal with these pests, but I do not know of a single one that we have prevented from coming to this country or stamped out after it had reached here.* That we have and are saving the country millions of dollars annually by our advice and experiments I freely admit, but that is only a temporary relief, and by no means a protection against future depredations and losses. Now, there must be something the matter somewhere, and if not with the entomologists, as I feel that it certainly is not, then wherein lies the obstacle? Entomologists do not make the laws, nor are we always able to get those properly enforced that we do have; but that does not settle the problem. For my own part, I have very little faith in State laws, even if they could be enacted, and have often asked myself the question whether or not it was possible for a republican government, composed of minor governments, possibly, as in our case, numbering nearly half a hundred to protect its people from the immense losses occasioned yearly by destructive insects whose place of nativity is known to be thousands of miles away and across wide stretches of ocean which they could never have crossed unaided.

At present we seem unable to deal with the problem intelligently and practically, even within our own borders. We can not, as a people, protect ourselves from each other, much less from countries who very naturally have less regard for us than we have for ourselves. It was with such feelings that I watched the diffusion of the San Jose scale, even after it had been located. Here was a simple problem in national economic entomology, and the question appeared to me to be composed of two propositions, viz.: Could we do anything with it? and if so, what would be the importance of the entomologist in this transaction? We have been steadily gaining strength during the last quarter of a century, and I was a little desirous of seeing how powerful we were getting to be, how much we could do to stop the spread of this pest, as well as to effect its extermination where it had already gained a foot-hold. True, we had no laws to sustain us; but if we could but show the necessity for them we would have accomplished much, for, while

*See appended note at the end of this paper.

the San Jose scale is the latest importation, it by no means follows that it will be the last. It is all right to study the biology of the insect, and this is really the first step to be taken, but the duty of the economic entomologist does not stop there by any means. The man who has been unfortunate enough to get the thing in his orchard wants to know all he can learn about it, but the one who is free of it would vastly more like to know how to keep free of it. Some of you are aware that I am not in the least in sympathy with the manner in which we have been dealing with this pest, or rather with those who have knowingly carelessly harbored it. I do not say this with a spirit of fault finding or criticism, but rather with the idea of improving upon the policy. I fully submit that it is not right to knowingly wreck the business of any nurseryman who is willing to do everything in his power to prevent distributing such a pest with his stock; but it seems to me that we commit even a greater mistake and do a more unjust act when we say that such a pest is in a certain locality, thereby throwing the onus on both the innocent and the guilty. This appears to me to be the very worst sort of an injustice, and places a premium on dishonesty. We should either give the name of the proprietor or else make no public statement whatever, giving him notice that any attempt to send out infested trees or plants will result in a prompt exposure and public condemnation.

If I were to say that a member of this association was a murderer, it would reflect on the honour of all of us, and would serve to protect the guilty one from justice, provided there was such a one among us. Hereafter when we have to quarantine, let it be against individuals or firms and not against States or portions of States in which the innocent outnumber the guilty. We must use harsh and severe measures where such are necessary in order to be just to the deserving, but we have no right to make these deserving ones a partner in dishonesty with the unworthy and disreputable. To do this is but to place ourselves in a position where we are sure to be imposed upon by the latter and secure the merited distrust of the former. The people are coming to place some of their interests in our keeping, and if we would hold on to that confidence we must deal justly but firmly with those who threaten such interests, with the sole aim of profiting thereby. Even if entomologists were clothed with the right to enter into an agreement with nurserymen to keep the presence of a dangerous pest a secret from the public, which I strongly question, it is poor policy to do so. For a public servant to make private arrangements with those harboring public enemies is, generally speaking, a risky business and not usually conducive in elevation to the estimation of those whose esteem we can not well afford to ignore. There should be a discrimination between the deserving and the undeserving, but it should be extended and not promised, and even then with the understanding that it was entirely in the way of official assistance. If we follow the proper course, so as to merit the confidence of the people, the latter will be perfectly satisfied with the information that infested nurseries are under strict surveillance, and nothing infested will be allowed to go out; but let there be a few more revelations of the actions of some of these, such as we have seen within the last year, and people will naturally begin to speculate as to whom we are assisting and whose interests we are protecting.

I mention these things because I believe we can improve upon the policy that some of us have been following, largely by force of circumstances. What I would urge is this: First, a uniform policy to be followed as closely as our surroundings render possible by all of us; second, on the information of an infested nursery coming to us the proprietors are to be informed that no infested stock is to be sent out, and that they are to promptly go to work to stamp out the pest, and that any attempt to evade these rules will result in a prompt exposure. If it is known that their trade will not suffer if they choose to purchase their stock from uninfested localities until they have destroyed the pest on their own, most men will see at once that it is the least expensive way out of the trouble. I am satisfied that there is a method of procedure that will work the least hardship to the deserving, yet will compel the stubborn to keep infection confined to their own premises and stamp it out there as soon as possible. I believe that we hold the balance of power, so to speak, and need not barter our influence, but hold it to be sought for by those who wish to escape with the least trouble and loss. If we are but just in our actions there will no trouble about the better class of nurserymen siding with us, and we

shall have no difficulty in indicating the dividing line that separates the honorable from the dishonorable, and it will avail nothing for a belligerent firm to close their grounds and books against inspection and then demand our proof of infection. The very lack of proof of non-infection will be sufficient to fasten suspicion upon them.

I have noticed that the services of entomologists have been quite in demand during the last year by nurserymen who were free of the San Jose scale, and the statements of such entomologists were used in the advertisements of these firms; and I think the influence of Dr. Lintner and myself has been felt by at least two nursery firms when it came to the question as to whether they could continue to impose on the public or not. Now, while, as I stated, we have no laws to sustain us, we have a strong public sentiment in our favour, quite sufficient to influence the honorable to favour our plans, and the others we can whip into line, so to speak, by working on their interests. While we have not come out of this contest just in the shape that I wish we had, we have certainly placed our profession on a better footing and shown that we have a power to do for right and justice; that we can help the deserving and at the same time deal firmly and judiciously with the undeserving and disreputable; and so long as we are faithful to our trust we shall be able not only to hold our influence but greatly increase the same.

I confidently look for considerable aid from nurserymen themselves in the matter of preventing the distributing of orchard pests. The most pushing and energetic are beginning to see that it will pay to spray their trees year after year in the nursery row with both insecticides and fungicides; that by so doing they will get a better growth and consequently a larger number of first-class trees that will bring a better return for use of their land and labour. Now, these are not likely to be so blind as not to see that to be able to warrant their stock free from insect and fungus enemies will give them a prestige, and they will thus guarantee every bundle of stock that is shipped from their grounds. When we reach this stage of advancement it will be a small matter to get a United States law that will make this a condition of acceptance for transportation by the railway and express companies.

In the past our advice and cautions have been more or less ignored, but I think if a nurseryman were about to import trees or bring them from California he would think of consulting the United States entomologist in regard to the risk he would run with respect to injurious insects. And there is little doubt that there will be much more caution exercised in future than there has been in the past, and the next new thing we get we shall be better prepared to exert our power and influence than we were in this case. I am satisfied that the San Jose scale can be stamped out where it has been introduced, at least between the Rocky and Alleghany mountains. East of this area it will have to be exterminated or else many nurseries will be compelled to suspend business for lack of customers, and they are not going to do this in the near future. We have done well this time, but we will do better in the future.

NOTE.—The fluted scale of the orange (*Icerya purchasi*), though it has been subjugated in California, at a saving of thousands, if not, indeed, millions, of dollars (and the importation of the natural enemies whereby this was accomplished was the greatest achievement ever attained in practical entomology), still it has yet to be exterminated. So of the gypsy moth (*Ocneria dispar*), introduced into Massachusetts by a lamentable piece of carelessness on the part of an entomologist many years ago, while it has been overcome in some localities, it has not been exterminated. I am free to confess that up to the time of presenting this paper I had very serious doubts as to the possibility of this ever being done; not because of any fault or neglect among those intrusted with the work, but because it appeared to me that they had attempted an impossibility. I have since spent a day in examining the work in all of its details, and believe that I saw not only what had been done, but also what yet remained to be accomplished; and that, too, with unprejudiced eyes and mind, and in company with one who clearly had no other motive than to show me every feature precisely as it existed, without magnifying, minifying or concealing anything. I now feel confident that the question of the extermination of this

pest in Massachusetts is simply one dependent upon the support in future given those in charge of the work ; that with proper support financially this pest will be absolutely wiped out of existence in America, and that the achievement will be the greatest yet attained, and one of which we shall all feel proud, while it will redound to the credit of economic entomology all over the civilized world.

F. M. W.

Mr. Fernald asked if anyone was aware of wilful and malicious importations of injurious insects from Europe, referring in this connection to the report of the possible transportation of certain American insect pests in the opposite direction. He was himself aware of no such cases.

Mr. Smith said the only case known to him was the importation of the *Ailanthus* silkworm.

Mr. Sitrine, referring to Mr. Webster's communication, said that he had found about the 1st of July instances of the purchase of apple trees badly infested with living San Jose scale, which had supposedly been effectually treated before being sold and sent out.

Mr. Smith said that he was aware that these trees had been treated with gas during the winter, and described the methods which had been followed. In the examination made by himself he had found no living scales, but undoubtedly some living specimens had been left, and probably from these the trees had become re-stocked. He pointed out the necessity of examining every scale before it was possible safely to pronounce stock immune, and therefore the impracticability of giving any such indorsement to nurseries.

Mr. Riley emphasized the extreme difficulty and great liability to error on the part of entomologists should they follow the plan of pronouncing any particular nursery free from scale. In some cases circumstances may warrant such an indorsement, especially if there is reason to believe that the insect in question is recently introduced and therefore confined to a restricted area or single point of infestation, as seemed, indeed, to be the case in the first discovery of the San Jose scale in the east. In such cases it may not be necessary to give publicity to the point of infestation if proper measures are being taken to suppress the insect. It was on this basis that he acted in the case of the San Jose scale ; but when an insect is known to be widely disseminated a full public statement of the extent of the infested locality is desirable.

Mr. Smith agreed with Mr. Riley as to the difficulty of pronouncing any nursery untainted, and had decided for himself not to give clean bills of health to any nurseries in future.

Mr. Southwick read a paper entitled "Economic Entomological Work in the Parks of New York City."

Mr. Webster read a paper on the "Insects of the year in Ohio." The time available for the reading of papers having expired, the three following, whose authors were absent, were read by title only, viz.:—"On the Natural Conditions which Affect the Distribution and Abundance of Coccidæ," by T. D. A. Cockerell, Las Cruces, N. Mex.; "How shall we Improve our Collections?" by C. P. Gillette, Fort Collins, Colorado; and "Carbon Bisulphide for Crayfish," by H. E. Weed, Agricultural College, Miss.

The following resolution relative to the Gypsy Moth Commission, introduced by Mr. Howard, was now brought up and received the unanimous indorsement of the Association :

Resolved, That it is the sense of this Association that the present Gypsy Moth Commission is prosecuting its work in the most intelligent and praiseworthy manner, and that its hands should be upheld by the State authorities.

Mr. Lintner presented the following resolution, which was also unanimously adopted :

Resolved, That this Association has learned with deep regret of the intended discontinuance of *Insect Life* with the present number. In consideration of the unusual value of this publication, the eminent ability with which it has been conducted, the high appreciation in which it has been held by all of our entomologists and those in other countries, and the importance of the published investigations into the life history of insects, largely on their economic aspect, this Association earnestly requests of the Department of Agriculture that the resumption of the publication of this invaluable publication may be directed at no distant day.

The Committee on Nominations, consisting of Messrs. Lintner, Davis and Rolfs, proposed :

For *President*, C. H. FERNALD, of Amherst, Mass.

For *First Vice-President*, F. M. WEBSTER, of Wooster, Ohio.

For *Second Vice-President*, HERBERT OSBORN, of Ames, Iowa.

For *Secretary*, C. L. MARLATT, of Washington, D. C.

On motion, the chair was instructed to cast the ballot of the Association for the gentlemen named, and they were declared duly elected.

On motion of Mr. Southwick, the reading of the minutes of the entire meeting was dispensed with, and on motion of the same gentleman a vote of thanks was tendered the President and Secretary of the Association in recognition of their services.

On motion of Mr. Howard, the local committee in charge of the meeting at Springfield was given a vote of thanks.

President-elect Fernald took the chair and briefly expressed his thanks for the honour conferred upon him.

The Association then adjourned.

WILLIAM H. EDWARDS.

Our readers will all, we are sure, be glad to receive the excellent portrait prefixed to this volume of the well-known and now venerable entomologist, Mr. W. H. EDWARDS, of Coalburgh, West Virginia. His life-long work has been the study of diurnal lepidoptera, and the results of that work are splendidly set forth in the beautifully illustrated volumes of his "Butterflies of North America." In April, 1868, the first part was issued, and at once commended itself to entomologists everywhere by the exquisite beauty and finish of the plates and their faithfulness to nature. In July, 1872, the first series, forming a large quarto volume with fifty plates, was completed. The second series, containing fifty-one plates, was begun in May, 1874, but not finished until November, 1884; the less frequent issue of the parts being more than compensated for by the increased value of both plates and letter press. When the work was begun, as Mr. Edwards stated in his preface, little or nothing was known of the eggs, larvæ, or chrysalids of any except the commonest butterflies, and accordingly his first volume illustrated only the perfect state. In 1870 he made the notable discovery that eggs could be satisfactorily obtained by confining the female butterfly of any species with the growing food-plant of its larva, and at once began the study of the life-histories of a number of species previously known only in the imago state. The results of these studies are admirably set forth in the letter press as well as in the plates of the second and third series; on these are accurately depicted eggs and larvæ in their different stages, as well as chrysalids and imagoes. Many wonderful discoveries have been made during these investigations, among the first being that of the seasonal trimorphism of *Papilio Ajax* and the dimorphism of *Grapta interrogationis* and of *G. comma*. The process of breeding was soon taken up by Mr. Edwards's friends and correspondents all over North America, and, aided by the general extension of railways over the continent, he was able to get eggs of butterflies from widely distant localities, and to follow them successfully through all their stages. Thanks to his efforts the reproach of ignorance of the preparatory states of our butterflies has been removed, and though much remains to be learnt, vast progress has already been made. The first part of the third series was issued in December, 1886, and in October last we had the pleasure of welcoming the sixteenth. Far from showing any decline from the author's high standard of excellence, this last issue may justly be regarded as the climax of good work, both on the part of the writer and the artist. All through Mr. Edwards has been fortunate in having his wishes so ably carried out by his artist-assistants—Mrs. Mary Peart, of Philadelphia, who has drawn most accurately nearly all the plates, and in order to do so satisfactorily has reared most of the caterpillars; and Mrs. Lydia Bowen who has so exquisitely performed the work of colouring. Many of the plates of the third series have been drawn by Mr. Edward A. Kellner, of Philadelphia.

In addition to the great work that we have just referred to, Mr. Edwards has contributed largely to the periodical literature of the science, especially to the proceedings and transactions of the American Entomological Society and to the *Canadian Entomologist*. His first contribution to its pages was published in the third number of the first volume, in 1868, and he has continued to favour it with articles of great value ever since, his last paper, in the September number of volume xxvii., being the one hundred and sixty-eighth which he has written for our journal.

Mr. Edwards was born on the 15th of March, 1822, and will soon complete his seventy-fourth year. That he may long be spared in health and prosperity to carry on his excellent work is the cordial wish of the writer and all his friends.—C. J. S. B.

BOOK NOTICES.

THE BUTTERFLIES OF NORTH AMERICA, with coloured drawings and descriptions, by W. H. Edwards. Third series, part xvi. Houghton, Mifflin & Co., The Riverside Press, Cambridge, Mass.

Though nearly a twelvemonth has gone by since the preceding part was issued, we could well afford to wait with patience for another number, when our author rewards us with so much that is remarkably interesting as well as valuable regarding the life-histories of some hitherto little known butterflies.

The first plate, which as usual is exquisitely drawn and coloured, depicts the female of *Parnassius smintheus*, Doubl.Hew., and both sexes of the variety *Hermodur*, H. F. Edw., together with the egg, larva in all its stages, chrysalis, last segments of the male butterfly, and many highly magnified details. After giving a description of the various stages of the insect, the author relates many most interesting facts regarding the life and habits of the butterfly, which have taken expert observers in the States of Colorado, Montana and Washington no less than twenty years to accumulate! The account is concluded with a description of the formation of the extraordinary pouch or keel which is to be seen beneath the abdomen of the females of various species of *Parnassius*. That this should be formed by the male is one of those strange marvels that render the careful study of the lives of our butterflies so interesting and attractive.

The second plate depicts both sexes of *Satyrus Charon* and the male of its variety *Silvestris*; also the egg, the various stages of the larva, the chrysalis, and many details. The imago and the several preparatory stages are described, and a short but interesting account is given of the habits of the butterfly and the rearing of the larvæ.

On the remaining plate are figured the egg, three stages of the larva with details, and both sexes of the imago of the British Columbian species (*Chionobas gigas*), Butler. After describing the preparatory stages so far as known, the author relates the differences in appearance and habitat between this species and *Californica* and *Iduna*, which are frequently confused in collections. *Gigas* is shown to be confined, so far as is yet known, to Vancouver Island, where the male frequents the tops of the highest mountains, the female being usually found much lower down; *Iduna* inhabits the slopes of the evergreen red-wood forest in north-eastern California on the Pacific coast; and *Californica*, the hot arid regions of east Oregon, Washington and the semi-desert portion of north-east California. "*Gigas* is semi-Arctic, living amid the cold, dark fir forest; *Iduna* is temperate, living in the mild, dark red-wood forest; *Californica* is semi-tropical, living in open, dry, warm glades in the "bushland" on the border between the forest and the open plains. *Gigas* alights on bare rocks; *Iduna* on green twigs; *Californica* on dead or dry grass." But we must refer the reader to the book itself for all the interesting particulars regarding these strange butterflies.

The wonder to us is that so few entomologists subscribe to this magnificent work. The parts are issued at such long intervals that the cost is very light; those who have secured them know what a treasure they possess and how highly they prize it.—C. J. S. B.

THE NATURAL HISTORY OF AQUATIC INSECTS, by Prof. L. C. Miall, F. R. S. London and New York, MacMillan & Co. (66 Fifth avenue, N. Y.; price, \$1.75), pp. 395.

This interesting work is intended, as the author states, "to help those naturalists who take delight in observing the structure and habits of living animals," and also to revive an interest in the writings of some of the old zoologists who did notable work in their day, but who are now almost forgotten, namely, Lyonnet, Réaumur, Swammerdam and De Geer, of whose lives and work he gives a short account.

To any lover of nature who wishes to look into the lives and doings of living creatures, and to investigate their structure and appliances for carrying on the business of their lives, this book will prove a very great help as well as an unalloyed pleasure, and it ought to lead many a reader to explore for himself the ponds and pools in his own neighborhood which teem with insect life. The different groups of insects that live in the water in their larval or perfect states, are treated of in turn—water beetles and the larvæ of many flies, the caterpillars of some moths, caddis worms, May flies, alder flies (*Sialidæ*), stone flies (*Perlidæ*), dragon flies, pond skaters, water boatmen, etc. The very names of these insects bring to mind what one cannot fail to have seen and watched and wondered over. To have many of these wonders explained and described, and to have the insects themselves depicted and the peculiarities of their structure made clear by excellent woodcuts, is what we owe to the author of this book, and we hope that many will turn to its pages with profit and delight. It is a handsome volume, with clear, large type and a number of very good illustrations.—C. J. S. B.

The Cambridge Natural History, Vol. V. Peripatus, by Adam Sedgwick, M.A., F. R.S.C.; Myriapods, by F. G. Sinclair, M.A.; Insects, (Part 1) by David Sharp, M.A., F.R.S. London and New York, MacMillan & Co.

The possession of some such work as this is of primary importance to the student in any department of zoology, to enable him to obtain, and have at hand for reference, a general knowledge of the varied groups into which, for convenience of study and classification, the animal kingdom is divided. In every home that can afford the luxury of books it will also be found most valuable, affording a continual fund of instruction, and implanting in the children a spirit of inquiry, and of interest in the many wonders of nature. It is only about ten years since the publication, in six sumptuous quarto volumes, of the Standard Natural History, edited by Prof. Kingsley, and having as contributors many of the most eminent scientific men of America. To a certain extent their references and illustrations were more largely drawn from the fauna of our own continent, although a work of this general character must not be expected to be in any way restricted in its choice of examples of any group. Our knowledge of the animal kingdom is, however, so constantly being enlarged by the labours of an ever increasing and better equipped body of investigators, that the present work will be found to be considerably in advance of any previous publication. The editors are S. F. Harmer, M.A., Superintendent of the Cambridge University Museum of Zoology, and A. E. Shipley, M.A., University lecturer on the Morphology of Invertebrates. These names, and those of the authors of the various memoirs, are a guarantee as to the accuracy and completeness of the work, and of its fitness either for the private student or for the teacher of zoology. When finished it will consist of ten handsome large octavo volumes, which will form a desirable addition to any library.

Mr. Sedgwick's memoir on Peripatus indicates at once the marked advance that has been made in some directions of biological research. In the Standard Natural History, where it is placed as a sub-class—Malacopoda—of the insects, this curious genus occupies scarcely more than a page, for the knowledge of it was then very fragmentary. Mr. Sedgwick, whose studies of the genus have been very extended, and who has written previous monographs, gives a very interesting account not only of the outward appearance of this very peculiar creature, but also of its embryology, development and habits. There are numerous illustrations and a map showing the distribution, which extends through portions of South Africa, Australia, New Zealand, South and Central America and the West

Indies. Described by its discoverer, (Rev. L. Guilding), as a mollusc, from its slug-like form, this unique animal is now found to belong to the arthropods, although possessing features not belonging to other members of that division. Indeed it is said to "stand absolutely alone as a kind of half-way animal between the Arthropoda and the Annelida." As a very primitive type, exhibiting affinities to both groups, it possesses a special interest to zoologists. The species are few in number, and are of elongated slug-like shape, with from seventeen to thirty-four pairs of legs; subsisting upon animal food and shunning the light.

The Myriapoda are stated by Mr. Sinclair in his introduction, "not to have attracted much notice until comparatively recent times. Compared with insects they have been but little known. The reason of this is not hard to find. The Myriapods do not exercise so much direct influence on human affairs as do some other classes of animals; for instance, insects. They include no species which is of direct use to man, like the silk-worm or the cochineal insect, and they are of no use to him as food." To the farmer's crops, however, some species, known as wire-worms, (*Iulus*) do considerable damage, while many of the carnivorous species must, on the other hand, be of considerable assistance in destroying injurious insects. Myriapods are those elongate, many-footed creatures, lurking under rubbish and in dark places, which are usually called centipedes and millepedes. Regarded with distrust on account of the venomous bite of some of the large tropical species, their appearance and habits of concealment produce in most people a decided aversion to more intimate acquaintance. The author, however, gives a very pleasing summary of their habits, and proves that a study of these creatures, as is true of all forms of life, however repellant to the ordinary observer, is far from being devoid of interest. Our popular names are not sustained on closer examination, for none of the species have nearly a thousand legs, and a large proportion have far less than one hundred. The number varies from nine pairs in the tiny Pauropus, to about one hundred and seventy pairs in some species of *Notophilus*. The Myriapods have many affinities to the insects, and have been classed with them by many authors. They differ from insects, as well as from the other classes of arthropods, in having true, jointed legs on the posterior segments of the body. Mr. Sinclair recognizes five orders, the species of which vary in length from the one twenty-fifth of an inch (*Pauropus*) to almost a foot, as in the tropical centipedes. He does not mention, however, perhaps because it is now extinct, the great centipede, described in the Japanese tale of *My Lord Bag-of-Rice*, which inhabited *Mukade-yama* (Centipede Mountain) on the shores of Lake Biwa, and which was over a mile long, with exactly one thousand feet on each side of its body. Some of the forms, as *Glomeris*, are quite short and stout; others, as *Iulus*, have long cylindrical bodies; while *Notophilus* and *Geophilus* have the body very thin and elongated.

Eighty pages are occupied by these interesting memoirs on *Peripatus* and the Myriapoda, and in the third chapter Dr. Sharp introduces the Insects, and continues their discussion throughout the remaining five hundred pages, in a style that proves him a master of the subject, and also of its presentation to his readers. Naturally, as an Entomological Society, we take a closer interest in this great class, into which are grouped an immense assemblage of small creatures, varying to a wonderful degree in structure and habits, yet having, amidst all this diversity, well-marked relations to one another. To use the author's opening words "Insects form by far the larger part of the land animals of the world; they outnumber in species all the other terrestrial animals together, while compared with the vertebrates, their numbers are simply enormous. * * * * * The largest insects scarcely exceed in bulk a mouse or a wren, while the smallest are almost or quite imperceptible to the naked eye, and yet the larger part of the animal matter existing on the lands of the globe is in all probability locked up in the forms of insects. Taken as a whole they are the most successful of all the forms of terrestrial animals. In the waters of the globe the predominance of insect life disappears. In the smaller collections of water many insects find a home during a portion of their lives, and some few contrive to pass their whole existence in such places; but of larger bodies of water they invade merely the fringes, and they make only the feeblest attempt at existence in the ocean."

A not infrequent question is "What is an Insect?" and for the benefit of many who have not opportunity to study entomology, yet to whom some knowledge of the subject is important, it may be answered by the author's brief and clear definition of the class Insecta; or Insecta Hexapoda.

"Insects are small animals, having the body divided into three regions placed in longitudinal succession, head, thorax and abdomen: they take in air by means of tracheæ, a system of tubes distributed throughout the body, and opening externally by means of orifices placed at the sides of the body. They have six legs and a pair of antennæ; these latter are placed on the head, while the legs are attached to the thorax, or second of the three great body divisions; the abdomen has no true legs, but not infrequently has terminal appendages and, on the under surface, protuberances which serve as feet. Very frequently there are two pairs of wings, sometimes only one pair, in other cases none; the wings are always placed on the thorax. Insects are transversely segmented—that is to say, the body has the form of a succession of rings; but this condition is in many cases obscure; the number of these rings rarely, if ever, exceeds thirteen in addition to the head and to a terminal piece that sometimes exists. Insects usually change much in appearance in the course of their growth, the annulose or ringed condition being most evident in the early part of the individual's life. The legs are usually elongate and apparently jointed, but in the immature condition may be altogether absent, or very short; in the latter case the jointing is obscure. The number of jointed legs is always six."

The amplification of this definition and the exposition of the external and internal structure, and of the functions of the various organs, occupy two chapters. Referring to Parthenogenesis, or "the production of young without the concurrence of the male," which sometimes occurs, the remarkable fact is noted that in a few species of saw-flies, gall-flies and scale-insects no male is known, so that they must be considered as perpetually parthenogenetic. The next chapter gives a valuable summary of the embryology and metamorphoses. While the vast majority of insects are oviparous, the eggs deposited varying greatly in number, size and shape, a few species bring forth living young, as in the Aphididæ (green-fly or plant-lice), which thus multiply with extraordinary rapidity. A brief chapter follows on the classification, and it can readily be understood that diversity of opinion has existed, and may long continue, as to the most satisfactory arrangement of the vast hosts of insects. As some 250,000 species have already been described, and several times that number undoubtedly exist, any scheme of classification must, under our present knowledge, fail to adequately provide for the reception of every form. Dr. Sharp points out that owing to the present limited knowledge of the earlier stages of insects, the only complete system of classification yet possible must be based upon the structure of the adult forms. It is noted with pleasure that he does not consider it necessary to make so many orders or primary divisions as has been the tendency of recent authors. Instead of twenty, as recently proposed by Packard, he limits them, much to the advantage of the ordinary student, to nine, viz., Aptera, Orthoptera, Neuroptera, Hymenoptera, Coleoptera, Lepidoptera, Diptera, Thysanoptera, and Hemiptera.

The Aptera are designated as "small insects, with weak outer skin, destitute throughout life of wings or their rudiments, but with three pairs of legs; antennæ large or moderate in size." It is pointed out however that this definition does not clearly differentiate them from many of the young individuals of other orders, and that the order does not, as its name might indicate, include all wingless insects. Two sub-orders are present: Thysanura, with the abdomen composed of ten segments, and Collembola, of not more than six. The study of these insects is attended with more than ordinary difficulty, as their habits and fragile structure make them troublesome to collect and preserve. Campodea, supposed by many authors to represent one of the most primitive types of insect, and therefore of unusual interest, is said to be "so extremely delicate that it is difficult to pick it up, even with a camel's hair brush, without breaking it." The Collembola are the "Spring-tails," two of the three families having the abdomen provided with a leaping apparatus which enables them to jump about in a very vigorous

and erratic way. The Aptera are supposed to feed upon vegetable and animal refuse, and can endure both heat and cold, but require moisture, so that they occur most abundantly in cellars, under rubbish, in mosses, and other damp situations.

The Orthoptera form one of the most important orders of insects, both as regards the diversity of structure exhibited, the great size of many species, and the enormous devastation often wrought by their innumerable swarms. Dr. Sharp occupies nearly one hundred and fifty pages with his synopsis of the order, and his admirably written and illustrated account of the various groups should awaken, in all who are fortunate enough to read it, a lively interest in the insect world. He estimates that the order contains, at the lowest figure, 10,000 species, and treats it as composed of eight families. Of these the first is the Forficulidæ, or earwigs; elongate insects, having the abdomen terminated by a pair of clasper-like instruments, often greatly developed. Many of the forms are wingless, and those provided with wings are able to completely fold them up and tuck them under short wing covers, so that they have considerable resemblance to some beetles of the family Staphylinidæ. In Canada earwigs are poorly represented, and the one little species of *Labia* found in Ontario is but rarely met with. The family Hemimeridæ contains a few small, wingless, blind insects from equatorial Africa, interesting as occurring on small mammals either as parasites or commensals. The Blattidæ, or cockroaches, are both destructive and unpleasant creatures, although some forms are brightly coloured. Canada is not much troubled with these creatures, although a few disagreeable species have been introduced, but in warmer climates they are often veritable plagues. The Mantidæ, or praying insects, are wanting in our fauna, but in tropical and sub-tropical regions the species are numerous and their bodies are often strangely developed; sometimes by leaf-like expansions, serving to make them inconspicuous among the foliage in which they lurk. These developments of structure are even more marked in the Phasmidæ—stick and leaf insects—as shown by the figures of various genera.

The family Acrididæ contains those very prolific and voracious vegetarians, the locusts and grasshoppers. These breed so rapidly and appear in such enormous swarms as to make less incredible, than it might at first appear, the author's statement, previously quoted, as to the relative bulk of insects and other terrestrial animals. The migratory locusts at times destroy all vegetation over large areas, and may thus produce famine and disease. As Dr. Sharp says, "It is difficult for those who have not witnessed a serious invasion to realize the magnitude of the event. Large swarms consist of an almost incalculable number of individuals. A writer in *Nature* states that a flight of locusts that passed over the Red Sea in November, 1889, was 2,000 square miles in extent, and he estimates its weight at 42,850 millions of tons, each locust weighing one-sixteenth of an ounce. A second similar, perhaps even larger, flight was seen passing in the same direction the next day." The Locustidæ, or green grasshoppers, are more arboreal in their habits, and often have the wings of a very leaf-like appearance. They are also more musical, and capable of strong and sustained performances. The well known American Katydid belongs to this family. The last family, Gryllidæ, contains the crickets, whose concerts enliven the summer evenings. The fossorial, or mole crickets, have the front legs most admirably adapted for burrowing.

The treatment of the Neuroptera occupies an equal space and is no less interesting. The first family, Mallophaga, contains the biting or bird lice, so troublesome to birds and mammals. The Termitidæ, or white ants, are one of the most wonderful of all the groups of insects, and the individuals are strangely modified to fit them for their duties in the communities of which they are members. A table is given which shows that as many as fifteen distinct forms may occur (as in *Termites lucifugus*), and many of these may co-exist in the community, while others are only produced as necessity demands. The African species are the most remarkable, *T. bellicosus* forming solid mounds as much as twenty feet high. To sustain the population of these immense colonies, the queen becomes a marvellous egg-producing machine. "Twenty or thirty thousand times the bulk of a labourer," she is unceasingly fed by a band of workers, and as unceasingly gives forth eggs, to the number even of "eighty thousand and upward in one day of twenty-four

hours." To the Neuroptera belong also the ant-lions, dragon-flies and other well known insects. A large proportion are aquatic in their earlier stages, and most interesting in their habits, either as residents of the water or the air.

The last one hundred pages of Dr. Sharp's charming portrayal of the insect world is devoted to a portion of the Hymenoptera, the species of which are estimated at 250,000. This order contains, among its almost inexhaustible forms, those which are of exceptional interest, from the intelligence which governs their actions. Dr. Sharp has called attention to an error which has occurred through hasty writing of the explanation of the anatomy of *Sphex chrysis* (page 490, Fig. 333), where the letter *f* is called a division of the metanotum, whereas it really belongs to the mesonotum. This error will be corrected in the portion dealing with the Aculeata. The present volume only treats of the Sessiliventres, those in which the abdomen is broadly and closely joined to the thorax, and the parasitic families of the Petiolata, in which the abdomen is attached by a petiole, or stalk, often remarkably slender and prolonged. The first division includes the sawflies, of which the caterpillar-like larvæ are so injurious to vegetation, and the horn-tails, whose larvæ bore in the trunks of trees. The parasitic families exhibit much more variety of structure, and the species, even in our northern fauna, are exceedingly numerous. They vary in size; some Pimplids measuring several inches from the head to the tip of the very long ovipositor, while among the Proctotrypids and Chalcids are forms almost invisible to the naked eye. Dr. Sharp clearly tabulates the conditions under which the early life of such parasites is passed.

"1. The egg may be laid outside a larva, and the embryonic and larval developments may both be passed on the exterior.

2. The egg may be laid and the embryonic development passed through, outside the host, but the parasite on hatching may enter the host, so that the post-embryonic development is passed in the lymph of the host.

3. The egg may be laid inside the host, both embryonic and post-embryonic developments being gone through in the fluids of the host.

4. The egg may be laid inside another egg, the embryonic and post-embryonic developments being passed therein."

A large section of the Cynipidæ are not parasitic, but subsist upon plant tissues, producing swellings and distortions, known as galls, in which the larvæ live and develop. Among the illustrations of the Hymenoptera are excellent figures of four insects occurring in Ontario and other portions of Canada, viz., *Oryssus Sayi*, *Tremex Columba*, *Thalessa lunator* and *Pelecinus polyturator*, the last three being quite common insects. The illustrations throughout the volume, 371 in all, are both accurate and artistic, and many have been specially drawn for the work. The paper and press work are of the best, and the result is a very handsome volume. The appearance of the next volume, completing this most valuable and enjoyable account of the insects, will be eagerly awaited.

W. HAGUE HARRINGTON.

RAMBLES IN ALPINE VALLEYS, by J. W. Tutt, F.E.S.; 208 pages, five plates
London: Swan, Sonnenschien & Co.

The Editor of *The Entomologists' Record and Journal of Variation* has added another to his popular books on the beauties of nature. This time he takes the reader abroad to the lovely scenery of Switzerland on the Italian slopes of Mont Blanc, where he wanders for the most part out of the beaten track of the ordinary tourist. Much of the volume is filled with charming pen-pictures of the infinite variety of grandeur and beauty to be found among the lofty mountain tops, the towering crags, the densely wooded ravines and the dashing torrents of this secluded Alpine region. The eye of the naturalist does not fail to observe the marvellous variety of animal and vegetable life that is to be found in this limited area; and the author describes many a plant and flower, and especially the gay butterflies and pretty moths with which the region

abounds. Some of the most interesting passages are those that deal with the phenomena of variation caused by environment, the results of the glacial epoch in the distribution of species, the effect of altitude on plants and insects, the evolution of the genus *Colias*, the production of colours, the causes of hybernation, and other topics which arise from time to time as the author rambles through the valleys or climbs the Alpine hills. The perusal of such a book as this must help the reader to see and observe, and lead him on to think out for himself the causes and the objects of the life that everywhere surrounds him.—C. J. S. B.

A MANUAL FOR THE STUDY OF INSECTS, by John Henry Comstock and Anna Botsford Comstock ; Ithaca, N.Y. Comstock Publishing Co., 1895.

This is a work of 700 pages, profusely illustrated. A table of the classes of the Arthropoda is given, followed by a short characterization of the Crustacea. Thirty-three pages are devoted to the Arachnida, and a table is given for separating the principal families of the Araneida. The Myriapoda are briefly referred to, and chapter iii. begins the discussion of the true insects (Hexapoda). Nineteen orders are recognized, and a careful table is given for their practical determination.

In the remainder of the work, 618 pp., the several orders are treated with tables carrying the student to the families, each illustrated by typical common species, of which brief accounts are given.

In the lepidoptera, diptera and hymenoptera, the uniform system of nomenclature of the wing veins discussed by Prof. Comstock in "Evolution and Taxonomy" is applied throughout the orders. As stated in the preface, but slight changes are made from the usual classification of the families, except in the lepidoptera where the system proposed in "Evolution and Taxonomy" is adopted with slight changes. This is remarkably like Dr. T. A. Chapman's classification from pupal characters and the present writer's one on larval characters. All three agree in breaking up the old groups Zygænidæ and Bombyces, and the several members are referred to essentially the same places. The work affords for the first time a means for teacher as well as student to determine the family of any North American insect, for here synoptic tables replace the vague characterization so generally in vogue in zoology. To bring the tables down to species, as is done so satisfactorily in botany, as the author remarks, would make the work of enormous length, not to mention the fact that the present state of our knowledge of insects does not warrant such an undertaking. The work seems a very valuable and timely one.—Harrison G. Dyar.

We wish to add to the foregoing notice our hearty congratulations to Prof. Comstock and his talented wife upon the completion of their excellent work, and our tribute of praise for the thoroughly admirable manner in which they have performed it. It is now a little more than six years since we noticed in these pages the first part of this work, which consisted of 234 pages and 200 wood cuts; we then stated that "judging from the portion before us we have no hesitation in saying that the complete work will be a most valuable and admirable manual of entomology; in clearness and simplicity of style, in excellence of illustration and in arrangement of matter it leaves nothing to be desired." This prediction has been most completely fulfilled, the volume before us being, in several respects, even an improvement upon the original publication. The new illustrations are more artistic, and the diagrams of wing-venation and details are clear and accurate; the synoptic tables will afford any painstaking student satisfactory means of classifying into families any specimens that he collects, while the letter-press and figures will enable him to determine a large number of species. We heartily commend the work to all who are beginning to study entomology, and we can assure others, who have made some progress in the science, that they will find in it a vast deal of help and information that will prove of the utmost value. We may add that the illustrations consist of 800 wood cuts and six beautiful full-page plates, the one forming the frontispiece being coloured. The price of the work is so reasonable that it is within the reach of all.—C. J. S. B.

CANADIAN SPIDERS, by J. H. Emerton. Transactions of the Connecticut Academy, Vol. IX., July, 1894. Thirty pp., four plates.

This interesting and valuable paper treats of spiders collected in various parts of Canada from the Rocky Mountains to the Gulf of St. Lawrence. The author states at the outset that the species differ little from those of the New England States. "Out of sixty-one species, from Labrador to Manitoba, fifty-six species live in New England; and twenty-seven out of forty-eight species from the Rocky Mountains. Of the latter no less than forty of the species mentioned were collected by Mr. Bean at Laggan, and of these sixteen are described as new to science. Mr. Tyrrell, of the Geological Survey of Canada, supplied other species from the Rocky Mountain Region, Alberta Territory and Ottawa, and other collectors from the various localities mentioned in the paper. The plates illustrating the new species are admirably drawn by the author, the excellence of whose work in scientific illustration has long been well known and highly appreciated.—C. J. S. B.

REPORT OF OBSERVATIONS OF INJURIOUS INSECTS AND COMMON FARM PESTS, DURING THE YEAR 1894, with Methods of Prevention and Remedy. Eighteenth Report. BY ELEANOR A. ORMEROD, F. R. Met. Soc. etc., etc., London; Simpkin, Marshall, Hamilton, Kent & Co., Limited, 1895, pp. 122, lxii, plate.

In this the author has given us another of her most excellent annual reports, if anything, better than those that have preceded it. There are twenty-nine species, besides the two groups, Iulidæ and Vespidæ, fully treated in the report which is illustrated by forty-five figures and one excellent plate, the latter devoted to the Stem Eelworm, *Tylenchus devastatrix*, in connection with its recent discovery as injurious to hops. We congratulate the author on being able to give us so much information on Eelworms, Warble Fly and carabid enemies of the strawberry. In fact she has, throughout her report strictly adhered to the plan expressed in the preface, viz., "not to enter again on such of our common infestations as have been repeatedly noticed in my preceding reports, excepting where there was some new information to be given, or (sometimes) needed." This renders the report of unusual value. To do the publication justice is simply out of the question in an ordinary book notice, but suffice it to say that it is in every way a credit to its author.

The writer well remembers an evening spent with the late Frazer S. Crawford, at his suburban home near Adelaide, South Australia. We had been discussing entomology and entomologists, when he made a remark something like this. "Miss Ormerod is a noble woman and is giving both her life and her wealth to the agricultural interests of England, and I cannot understand why she should not be better appreciated by Englishmen." The sentiment will be echoed by American entomologists, but I fear in our hurry and bustle, we forget to drop an occasional word of encouragement and appreciation, such as we ourselves would gladly receive. Working almost alone, and comparatively unaided, in a labour of love not always appreciated, it seems to me that words of encouragement from her colleagues, both in America and out of it, are but matters of justice. Other reports on economic entomology there are, and they come officially from the Board of Agriculture of England, but the writer has searched through them in vain for tokens of originality or just credit for the information contained in them.—F. M. W.

OBITUARY.

CHARLES VALENTINE RILEY.*

The career of this distinguished naturalist, so suddenly closed while in good health, and with apparently many years of usefulness before him, was a remarkable one. Biologist, artist, editor and public official, the story of his struggles and successes, tinged as it is with romance, is one full of interest. Beginning life in America as a poor lad on an

*The following memoir of our lamented friend, Professor Riley, contributed to a recent number of "Science," by Professor A. S. Packard, is so excellent and complete that we prefer to give it in full rather than attempt to prepare another which would not be so satisfactory.—ED.

Illinois farm, he rose by his own exertions to distinction, and to become one of our most useful citizens in science, both pure and applied. His nature was a many-sided one, and his success in life was due to sheer will-power, unusual executive force, critical judgment, untiring industry, skill with pencil and pen, and a laudable ambition, united with an intense love of nature and of science for its own sake. This rare combination of varied qualities, of which he made the most, rendered him during the thirty years of his active life widely known as a public official, as a scientific investigator, while of economic entomologists he was *facile princeps*.

Charles Valentine Riley was born at Chelsea, London, September 18, 1843. His boyhood was spent at Walton-on-Thames, where he made the acquaintance of the late W. C. Hewitson, author of a work on butterflies, which undoubtedly developed his love for insects. At the age of eleven he went to school for three years at Dieppe, afterwards studying at Bonn-on-the Rhine. At both schools he carried off the first prizes for drawing, making finished sketches of butterflies, thus showing his early bent for natural history, and his teacher at Bonn urged him to study art at Paris. But it is said that family circumstances, though rather, perhaps, a restless disposition, led him to abandon the old country, and at the age of seventeen he had immigrated to Illinois, and settled on a farm about fifty miles from Chicago. When about twenty-one he removed to Chicago, where he became a reporter and editor of the entomological department of the *Prairie Farmer*.

Near the close of the war, in 1864, he enlisted as a private in the 134th Illinois regiment, serving for six months, when he returned to his editorial office.

He also enjoyed for several years the close friendship of B. D. Walsh, one of our most thorough and philosophic entomologists, with whom he edited the *American Entomologist*. His industry and versatility as well as his zeal as an entomologist, made him widely known and popular, and gave him such prestige that it resulted in his appointment in 1868 as State Entomologist of Missouri. From that time until 1877, when he left St. Louis to live in Washington, he issued a series of nine annual reports on injurious insects, which showed remarkable powers of observation both of structure and habits, great skill in drawing and especially ingenious and thoroughly practical devices and means of destroying the pests. The reports were models and will never become stale. Darwin wrote in 1871: "There is a vast number of facts and generalizations of value to me, and I am struck with admiration at your power of observation. The discussion on mimetic insects seems to me particularly good and original." In reviewing the ninth and last of these reports, published in 1876, the *Entomologists' Monthly Magazine* of London, remarked: "The author, in giving full scope to his keen powers of observation, minuteness of detail, and the skill with which he uses his pencil, and at the same time in showing a regard for that scientific accuracy—unfortunately too often neglected in works on economic natural history—maintains his right to be termed the foremost economic entomologist of the day." It goes without saying that this prestige existed to the end of his life, his practical applications of remedies and inventions of apparatus giving him a world wide reputation. In token of his suggestion of reviving the vines injured by the Phylloxera by the importation of the American stock, he received a gold medal from the French Government, and he afterwards received the cross of the Legion d'Honneur in connection with the exhibit of the U. S. Department of Agriculture at the Paris Exposition of 1880.

The widespread ravages of the Rocky Mountain locust from 1873 to 1877 had occasioned such immense losses in several States and Territories that national aid was invoked to avert the evil. The late Dr. F. V. Hayden, then in charge of the U. S. Geographical and Geological Survey of the Territories, with his characteristic energy and sagacity, initiated researches on the locust in the Territories. He sent Dr. P. R. Uhler to Colorado in the summer of 1875, and also attached the present writer to the Survey who spent over two months in entomological work in the same year in Colorado, Wyoming and Utah, publishing the results in Hayden's Ninth Report. Mr. Walsh had made important suggestions as to the birthplace and migrations of the insect. Meanwhile Riley had

since 1874 made very detailed studies on the migration and breeding habits and means of destruction of this locust (published in his Missouri State Report for 1876 and 1877). Dr. Cyrus Thomas had also been attached to Hayden's Survey, and published a monograph on the locust family, *Acrididae*. As the result of this combined work Congress created the United States Entomological Commission, attaching to it Dr. Hayden's Survey, and the Secretary of the Interior appointed Charles V. Riley, A. S. Packard and Cyrus Thomas members of the Commission. Dr. Riley was appointed chief, and it was mainly owing to his executive ability, business sagacity, experience in official life, together with his scientific knowledge and practical inventive turn of mind in devising remedies, or selecting those invented by others, that the work of the Commission was so popular and successful during the five years of its existence. Meanwhile in 1878 while the report of the Commission was being printed, Riley accepted the position of Entomologist to the U. S. Department of Agriculture, and during the season of 1879 and 1880 he investigated the cotton insects, but owing to the lack of harmony in the Department, he resigned, Prof. J. H. Comstock being appointed, and ably filling the position. Congress meanwhile transferred the cotton-worm investigation to the Entomological Commission. Riley was reappointed to the position of U. S. Entomologist in June, 1881. His successor, Mr. L. O. Howard, has stated how efficient, broad and thorough was his administration of this office: "The present efficient organization of the Division of Entomology was his own original conception, and he is responsible for its plan down to the smallest detail. It is unquestionably the foremost organization of its kind at present in existence." Again he writes: "Professor Riley's work in the organization of the Division of Entomology has unquestionably advanced the entire Department of which it is a part, for it is generally conceded that this division has led in most matters where efficiency, discipline and system were needed. Its plan and discipline have been cited by one of the heads of the Department as worthy of imitation by all, and your own honored Westwood, in expressing, in 1883, his admiration of Riley's work, said: 'I am sure it must have had a great share in inducing the activity in entomological work in America, which is putting to the blush the entomologists of Europe.'"

Indeed, so efficient, methodical and painstaking was Riley in whatever he undertook to do that had he been promoted to the position of Commissioner of Agriculture he would have been head and shoulders above any incumbent of that office, and, it is safe to say, would have administered its affairs with practical results far more valuable than those attained by any other Commissioner, as such an office should have been entrusted to a person who had had a scientific education, and not given as a reward for political service. As it is, he was the leader, says Mr. Howard, in many important innovations in the work of the department. His division published the first bulletin, and in *Insect Life* began the system of periodical bulletins, which has since been adopted for the other divisions of the Agricultural Department. He also took a large share in founding the Division of Economic Ornithology, Silk Culture and Vegetable pathology, the first two being placed for some time under his charge. In an address, says Howard, before the National Agricultural Congress, delivered in 1879, in which he outlined the ideal Department of Agriculture, Professor Riley foreshadowed many important reforms which have since become accomplished facts, and suggested the important legislation, since brought about, of the establishment of State Experiment Stations under the general government.

His practical, inventive genius was exhibited in his various means of exterminating locusts, in the use of kerosene oil emulsified with milk or soap, and in his invention and perfection—in which he was essentially aided by the late Dr. W. S. Barnard, who had special charge of the subject of mechanical appliances and remedies while connected with the Entomological Commission and the Agricultural Department, and whose "assistance was fertile from the first," as stated by Riley in his report—of the "cyclone" or "eddy-chamber" or Riley system of nozzles, which, in one form or another, are now in general use in the spraying of insecticide or fungicide liquids.

Although the idea of introducing foreign insect parasites or carnivorous enemies of our imported pests had been suggested by others, Riley, with the resources of his division

at hand, accomplished more than any one else in making it a success. We will let Mr. Howard tell the story of his success, with the efficient aid of Mr. Albert Koebeler, in introducing the Australian ladybird to fight the fluted scale :

“One other trait which we have not mentioned is his *persistence in overcoming obstacles*. Nothing daunts him, and the more difficult an end is to attain, so much the more energy and perseverance does he put in its pursuit. A recent instance of this quality we may cite: The fluted scale (*Icerya purchasi* Maskell) has done immense injury to citrus fruit in southern California of late years. Ascertaining that it is kept in check by natural enemies in its native home, Australia, Dr. Riley foresaw the importance of endeavoring to introduce these enemies. Not only did Congress refuse to appropriate money for the purpose, but it refused to do away with a clause in the Appropriation Bill restricting all expenditures to the United States. In this state of affairs most men would have given up the fight; but Dr. Riley, after great trouble, succeeded in accomplishing his end by inducing the Secretary of State to allow the sending of two assistants on the Melbourne Exposition Commission, and through their labors the desired result was reached. Hundreds of specimens of an Australian lay-bird (*Vedalia cardinalis*) were introduced into California, and the dreaded pest is now being speedily reduced to absolute harmlessness. Professor W. A. Henry, of Wisconsin, in a recently-published article, says of this matter, in speaking of the enthusiasm of the people of California over the results of this importation: ‘Without doubt it is the best stroke ever made by the Agricultural Department at Washington.’”

It might be thought that all this administrative work of the office and in the field would have left little time for pure science or for much general reading or deep thinking. Let us see what he actually did accomplish in pure science. Riley's scientific writings will always stand, and show as honest work, thorough-going methods, care and accuracy as his office work, and they alone, aside from his practical work, were enough to give him an international reputation. In some of his studies he was probably essentially indebted to his assistants for specimens and aid in rearing them; in others he evidently depended on his own unaided observations and his skill in drawing. He was not “a species man” or systematist as such; on the contrary his most important work was on the transformations and habits of insects, such as those of the lepidoptera, locusts and their parasites, his Missouri reports being packed with facts new to science. His studies on the chronology of all the broods known of the seventeen-year cicada, and its *tredecim* or thirteen-year race, carried on through a long succession of years, will prove of lasting value, having intimate bearings on evolution problems.

His work on the larval characters and hypermetamorphoses of the blister beetles, *Epicauta*, *Macrobasis* and *Hornia*, besides *Henous*, was thoroughly good and beautifully illustrated by his own pencil. He brings forward in this paper a mass of new facts regarding the *triungulin*, or first larval stage of these beetles, and those succeeding, which he designates as the *Carabidoid*, the *Scarabæidoid* stage, the *Coarctate* or *quiescent larva*, these stages preceding the pupa stage. The value of these facts as set forth by so trustworthy and keen an observer, and corroborating and greatly extending those worked out by European observers, is apparent when we consider that the *triungulin larva* is perhaps the nearest approach to the *Campodea*-like ancestor of the winged insects, that the *Meloidæ* are consequently among the most primitive and generalized of *Coleoptera*, and that from work based on such studies as these of the life-history of this and allied groups there has already resulted the germs of a truer phylogeny or classification of the entire order of *Coleoptera*. Of similar import are Riley's papers on the larval habits of bee-flies, on the luminous larviform females of the *Phengodini* and on the first larval stage of the pea-weevil (*Bruchus*). His studies on the systematic relations of *Platypyllus* as determined by the larva evince his patience, accuracy and keenness in observation and his philosophic breadth.

For over twenty years he made observations on the fertilization of *Yucca* by those remarkable tineoid moths, *Pronuba* and *Prodoxus*, and from time to time published papers and notices of progress in his work which culminated in his paper entitled, “The *Yucca* Moth and *Yucca* Pollination” (1891-'92), a memoir remarkable for the patient, unremitting work carried on during his spare hours, its thoroughness in dealing with structural details, its critical accuracy, and for its faithful and artistic drawings. It is a paper of interest to botanists as well as zoologists, and of value to the student of evolution. One of his last papers was a continuation and résumé of this subject, entitled “Some Interrelations of Plants and Insects” (1892).

Riley's contributions to the history and structure of the Phylloxera, of the scale insects, of the hop-plant louse, the Pemphiginæ, Psyllidæ, etc., are of permanent interest and value. His best anatomical and morphological work is displayed in his study on the mode of pupation of butterflies, the research being a difficult one, and especially related to the origin of the cremaster, and of the vestigial structures, sexual and others, of the end of the pupa. Whatever he did in entomology was original. He may occasionally have received and adopted hints and suggestions from his assistants, but he laid out the plan of work, supervised every detail, followed up the subject from one year to another, and made the whole his own. His originality in a quite different direction from biology is seen in his paper entitled "Perfectionnement du Graphophone," read before the French Academy of Sciences at Paris, in 1889. He was also much interested in Aëronautics, and took much delight in attending séances of spiritualists and exposing their frauds, in one case, at least, where another biologist of world-wide fame, then visiting in Washington, was completely deluded.

Riley was from the first a pronounced evolutionist. His philosophic breadth and his thoughtful nature and grasp of the higher truths of biology is well brought out in his address on "The Causes of Variation in Organic Forms," as Vice-President, before the biological section of the American Association for the Advancement of Science in 1888. He was a moderate Darwinian, and leaned, like other American naturalists, rather to Neo-Lamarckism. He says: "I have always had a feeling, and it grows on me with increasing experience, that the weak features of Darwinism and, hence, of natural selection, are his insistence (1) on the necessity of slight modification; (2) on the length of time required for the accumulation of modifications, and (3) on the absolute utility of the modified structure." Riley, from his extended experience as a biologist, was led to ascribe much influence to the agency of external conditions, remarking, in his address: "Indeed, no one can well study organic life, especially in its lower manifestations, without being impressed with the great power of the environment." He thus contrasts Darwinism and Lamarckism: "Darwinism assumes essential ignorance of the causes of variation and is based on the inherent tendency thereto in the offspring. Lamarckism, on the contrary, recognizes in use and disuse, desire and the physical environment, immediate causes of variation affecting the individual and transmitted to the offspring, in which it may be intensified again both by inheritance and further individual modification."

The following extracts will illustrate his clear and vigorous style of thought and expression and his attitude on the relations between science and religious philosophy. Regarding the question of design, he says: "Both Lyell and Gray believe in the form of variation having been planned or designed. It seems to me that the evidences of design in nature are so overwhelming that its advocates have an immense advantage over those who would discard it. A fortuitous cosmos is, to most persons, utterly inconceivable, yet there is no other alternative than a designed cosmos. To accomplish anything by a process, or by an instrument, argues greater, not less power, than to do it directly, and even if we knew to-day all the causes of variation, and understood more thoroughly than we do the method of evolution, we should only carry the sequence of causes a step further back and get no nearer to the Infinite or Original Cause."

"Evolution teaches that nothing is yet so perfect but it may be improved; that good comes of the struggle with evil and the one can never be dissociated from the other. The erect position which has given man his pre-eminence has brought him manifold bodily ills. No evolutionary sibyl looks to a millennium. Higher development must ever mean struggle. Evolution shows that man is governed by the same laws as other animals." "Evolution reveals a past which disarms doubt and leaves the future open with promise—unceasing purpose—progress from lower to higher. It promises higher and higher intellectual and ethical attainment, both for the individual and the race. It shows the power of God in what is universal, not in the specific, in the laws of nature, not in departure from them."

"The experience gained by those who have reached the highest ethical and intellectual growth must be formulated in precept and principle to be of any benefit to society at large, and the higher ethical sentiment and religious belief—faith, love, hope, charity—are priceless beyond all that exact science can give it."

Riley, an excellent head of a bureau, but sometimes uncomfortable and too independent as a subordinate, at times got into hot water with his superiors in the Department. He was sensitive to criticism, and was somewhat prone to controversy, usually, however, winning in such encounters. Until one came to know him more intimately he was liable to be misunderstood, and by his occasional bluntness made some enemies, but as years rolled on these passing antagonisms melted away.

Vigorous in mind and body, though of late years suffering from overwork, fond of out-door sports, he was a fearless rider on horseback, and an adept with the bicycle, on which, alas, he rode to his death.

His hospitable house at Sunbury was beautified by rare flowers, shrubs and trees, of which he was passionately fond. He was domestic in his tastes, and left a wife and five children to mourn his loss.

Riley left an indelible mark on his time, and the historians of natural science and of agriculture in America will scarcely ignore the results of thirty years of earnest work in pure and applied entomological science.

His scientific honors were well deserved. He was a member of many societies at home and of the entomological societies of France, Berlin, Switzerland and Belgium. He was elected in 1889 an Honorary Fellow of the Entomological Society of London, and was also Honorary Fellow of the Royal Agricultural Society of Great Britain. He was for two years President of the Academy of Science of St. Louis, being the youngest member so honored. He was founder, and for two terms President, of the Entomological Society of Washington, one of the founders of the Biological Society of that city, and an honorary member of the horticultural societies of Illinois, Iowa, Kansas and Missouri. The Kansas State Agricultural College gave him the degree of A.M., and the Missouri State University, in 1873, conferred upon him the degree of Ph. D. He was lecturer on entomology at Cornell University and at other institutions.

A. S. PACKARD.

Brown University.

INDEX.

	PAGE.		PAGE.
Acronycta hasta	40	Coleoptera, Winter, found in moss	50
Actias luna	36	Copipanolis cubilis	40
Agriculture, The new	7	Corthylus columbianus	81
Agrilus ruficollis	69	Cossus centerensis	25
Anasa tristis	69	Cotton-wood beetle	80
Anisopteryx pometaria	54	Cottony-cushion scale	12, 18
Annual meeting, Association of Economic Entomologists	67	Council, Report of	4
Annual meeting, Entomological Society of Ontario	3	Curator, Report of	3
Antheræa mylitta	3	Cut-worms	32, 76
Anthrenus scrophulariæ	36	Dermestidæ, Herbivorous habits of some ..	76
" verbasci	77	Destructive insects, Importation and repres- sion of	83
Aphis persicæ-niger	35	Diamond-back moth	32
Aquatic insects, Natural history of: MIALL	89	Dicopis Grotei	40
Argynnis Aphrodite	38	" viridescens	40
" Atlantis	38	Dilophonota ello	41
" Bellona	38	Dyar, H. G., Article by	94
" Cybele	38	Edwards, William H.	87, 88
" Idalia	39	Election of officers	6, 30, 87
" Myrina	38	Elm-leaf beetle	69, 78
Aspidisca splendoriferella	56	Entomology, Value of	16
Attagenus piceus	76	Ephestia Kuhniella	36
Baldwin apple, Origin of	13	Eupsalis minuta	81
Bark scale-louse	58	Feralia major	40
Bethune, Rev. C. J. S., Articles by	15, 87, 88, 89, 93, 94	Field days	31
Birds as protectors of orchards	53	Fletcher, J., articles by	16, 31
Boeus minutus	53	Fluted scale of the orange	85, 98
Book notices	88	Forbush, E. H., article by	53
Botanical Section, Report of	26	Forest tree insects, Study of	80
Bryaxis conjuncta	51	Fyles, Rev. T. W., articles by	21, 28
" propinqua	51	Gastropacha Americana	40
Buffalo moth	77	" ferruginea	40
Buprestis borer	23	Geological Section, Report of	26
Butterflies of North America: EDWARDS ..	87, 88	Glycobius speciosus	24
Cambridge Natural History, The	89	Gortyna cataphracta	32
Canadian Entomologist	31	Grasshoppers	31, 62
Canker worms	34, 54, 55, 73	Gryon Canadensis	53
Carneades messoria	76	Gypsy moth	54, 68, 78, 85, 86
Carpet beetles	36, 76	Hadena arctica	32, 38
Cerura scolopendrina	41	" devastatrix	32
Chionaspis furfurus	33	Harrington, W. H., articles by	47, 89
Chionobas Californica	88	Hemiptera, Winter, found in moss	51
" gigas	88	Hessian fly	32
" iduna	88	Hopkins, A. D., article by	80
Chittenden, F. H., Article by	76	Hoplogryon brachypterus	53
Cigar-case bearer	34	Horn-fly of cattle	20
Clisiocampa Americana	54, 59	How the forest in the district of Bedford was swept away	21
Clover-seed midge	18	Hyblæa puera	40
Coleophora Fletcherella	34		

	PAGE.		PAGE.
Hymenoptera, Winter, found in moss.....	52	Phytonomus nigrirostris	51
Hypochlora alba	62	Phytoptus pyri.....	35
Ianassa lignicolor	40	Pieris protodice	39
Icerya Purchasi	12, 18, 85, 98	“ rapæ.....	32, 39
Injurious insects, Report on English: ORM- EROD.....	95	Pine tree borers	23
Insect injuries of the year 1895.....	31	Platysamia ceonothi.....	3
Isoscma hordei	32	Plutella cruciferarum.....	32
James, Prof. C. C., Address by	7	Podisma Dodgei.....	63, 66
Joint-worm	32	“ glacialis.....	63
Lachnocrepis parallelus	51	“ Oregonensis	63
Librarian, Report of.....	3	Potato, Insects attacking	12, 19, 32, 70
Lina scripta.....	80	Prionus unicolor.....	24
Locusts, Canadian species of.....	62	Protoparce cingulata.....	41
Lophodonta Georgica.....	40	Pyrgus tessellata.....	41
Luna moth, growth of wings.....	36	Rambles in Alpine valleys: TUTT.....	93
Lymexylon sericeum.....	81	Raupenleim and Dendrolene.....	72
Mamestra detracta	40	Report of Botanical Section.....	25
Manual for the study of insects: COMSTOCK.	94	“ Council	4
Maple-tree borer	24	“ Delegate to Royal Society.....	28
Mayor of London, Address by the	7	“ Geological Section.....	26
Mediterranean flour moth	36	“ Librarian and Curator	3
Melanoplus atlantis	32, 64	“ Microscopical Section.....	27
“ bivittatus	32, 65	“ Montreal branch	6
“ femur-rubrum	32, 64	“ Treasurer	4
“ species of, in Canada.....	63	Riley, Charles V., Memoir of	95
Melipotis jucunda	40	Rocky Mountain locust and its allies in Canada	62
Melittia ceto	69	San Jose scale.....	83
Microscopical Section, Report of	27	Sarpedon scabrosus	31
Moffat, J. A., Articles by.....	36, 38, 41	Satyrus Charon	88
Monohammus confusor	23	“ sylvestris.....	88
“ marmorator	23	Scale insects	33, 83
“ scutellatus	23	Schizura leptinoides	40
Montreal branch, Report of	6	Scolytus destructor.....	24
Morrisonia evicta	40	“ rugulosus.....	72
Moss, Winter insects found in.....	47	Scopelosoma devia	40
Mytilaspis pomorun	58	Scudder, S. H., article by	62
Nemeophila petrosa	3, 5	Scurfy bark-louse.....	33
New York plum scale.....	33	Smith, J. B., articles by	67, 72
Obituary	95	Species, Definition of	44
Observations on the season of 1895.....	38	Spergula arvensis.....	26
Ocneria dispar.....	85	Spiders, Canadian: EMERTON.....	95
Oecanthus niveus.....	36	Spraying without a pump.....	70
Oodes fluvialis	51	Taphrocerus gracilis	51
Otiorynchus ovatus.....	32	Tent caterpillars	54, 59
Oyster-shell bark-louse	33	Treasurer, Report of.....	4
Packard, Prof. A. S., article by	95	Tree cricket.....	36
Palaearctia vernata.....	55	Tremex Columba.....	24
Paris green, Use of.....	12, 19, 32, 34	Trichobaris, tri-notata	70
Parnassius Hermodur.....	88	Trogoderma tarsale.....	76
“ Smintheus.....	88	Ulopa Canadensis	52
Peach aphid, The black	35	Variation, with special reference to insects.	41
Peach bark-borer	34	Vedalia cardinalis	12, 18, 98
Pear-leaf blister-mite	35	Webster, F. M., articles by	83, 95
Perigea luxa.....	40	What is an insect?.....	91
Phlæotribus liminaris.....	34	Winter insects from swamp moss.....	47
Phætalotes Nebrascensis	63	Xylomiges dolosa.....	40
		Xylophasia lateritia	40

SPCL SB 354.6 C2 F783 1815

