



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

1894

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ONTARIO FRUIT GROWERS ASSOCIATION.

TWENTY-SIXTH ANNUAL REPORT

OF THE

FRUIT GROWERS' ASSOCIATION

OF ONTARIO

1894.

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

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CONTENTS.

	PAGE.
LETTER OF TRANSMISSAL	1
OFFICERS FOR 1895	2
CONSTITUTION AND BY-LAWS	3
AFFILIATED SOCIETIES	4
ANNUAL MEETING	5
President's Annual Address : T. H. RACE, Mitchell	5
Fungi : Prof. J. H. PANTON, O. A. C., Guelph	8
Frauds in Fruit : A. M. SMITH, St. Catharines	14
New Fruits at Ottawa : Prof. JOHN CRAIG, Central Experimental Farm, Ottawa	16
Apples for Northern Ontario : J. H. TOOL, Orillia	19
The Membership of the Ontario Fruit Growers' Association should be increased : THOS. BEALL, Lindsay	20
Report of Affiliated Societies	22
Report on Grape Catalogue	23
Report on Apple and Pear Catalogue	25
Score Cards for judging fruits : L. WOOLVERTON, Secretary	27
Progress in Spraying during 1894 : Report by Prof. JOHN CRAIG	31
Spraying Calendar	42
Roads and Road-Making : ANDREW PATULLO, Woodstock	46
The Packing and Shipment of Fruit : C. C. JAMES, Deputy Minister of Agriculture, Toronto	52
Flowers : Mrs. MCKINNELL, Orillia	56
Floriculture as a Business for Women : Miss HODGES, Orillia	57
Tree Planting in its Relation to Road-Making : A. PATULLO	59
The Higher Horticulture : C. C. JAMES	60
Treasurer's Report	64
Report of Finance Committee	64
Report of Fruits Tested by the Association since 1875	65
Report of Committee on Experiment Stations	70
New Fruits Examined in 1894 : D. W. BEADLE, Toronto	71
Seedling Apples : Report of Committee on New Fruits	79
Report of Nominating Committee	85
Fruit Growing in the Beaver Valley : J. G. MITCHELL, Clarksburg	86
Notes on Strawberry Growing : W. W. HILLBORN, Leamington	90
Co-operative Apple Growing : E. B. EDWARDS, Peterborough	94
Fertilization of Flowers in Orchards and Vineyards : Prof. BEACH, Geneva, N. Y.	96
Packing Fruit for Export : Report of Committee	108
Cold Storage in Fruit Growing Centres : A. H. PETIT, Grimsby, and Prof. J. CRAIG.	109
Notes of Travel Among Ontario Fruit Growers : H. L. HUTR, O. A. C., Guelph.	112
Question Budget	115
Score Cards : Report of Committee	117
Fruit Exhibit : Report of Committee	117
Fruit Inspection : The Secretary	119
Score Cards : Revised Report of Committee	122

	PAGE.
Collections of Apples, Resolution on.....	122
Spraying Experiments, Resolution on.....	122
Codling Moth and Plum Curculio : Prof. JAMES FLETCHER, Central Experimental Farm, Ottawa.....	122
Pruning Trees—Especially the Apple : W. S. TURNER, Cornwall	131
Bulbs : Rev. W. BACON, Orillia.....	132
Hardy Fruits for North Simcoe : G. C. CASTON, Craighurst.....	136
Roses for Outdoor Culture : T. H. RACE, Mitchell.....	138
Resolutions	140
 APPENDIX I.	
The Packing and Marketing of Peaches : W. BOULTER, Picton.....	141
Beekeeping and Horticulture : J. R. HOWELL, Brantford	142
The Vegetable Garden : W. WARNOCK, Goderich	143
Gardening : J. CUPPAGE, Orillia	144
Some Handsome August-Blooming Flowers : D. W. BEADLE, Toronto	146
Roses : WEBSTER BROS., Hamilton	147
Hedges : CHARLES E. BROWN, Yarmouth, N.S.	148
Strawberry Growing—Things we have Observed : JOHN LITTLE, Granton.....	149
Communications	150
 APPENDIX II. (Report of Affiliated Societies.)	
The Burlington Horticultural Association, 1894	153
Brant Horticultural Society, 1895.....	154
Grimsby Horticultural Society ..	155
Woodstock Horticultural Society ..	155
Waterloo Horticultural Society.....	156
Niagara Falls Horticultural Society.....	156
Lindsay Horticultural Society	156
 APPENDIX III. (Catalogues of Fruits and Fruit Lists.)	
Catalogue of Apples.....	157
Catalogue of Grapes	159
Catalogue of Pears.....	161
District Fruit List of Apples	162
District Fruit List of Grapes	163
 APPENDIX IV. (Notes on Varieties of Fruits.)	
Our Outdoor Grapes and their Development from the Native Species of North America : Wm. PATTERSON, Clarenceville, Que.	165
The Fall and Winter Blenheim Orange : E. B. EDWARDS, Peterborough	167
The Hardiness of the Canada Red : R. W. SHEPHERD, Jr., Montreal, Que	168
The Sarah Raspberry : Prof. JOHN CRAIG, Ottawa.....	169
Notes on Varieties by the Secretary.....	169
Hints from Sister Societies.....	175
INDEX	179



MURRAY PETTIT, Esq., WINONA,
PRESIDENT OF THE FRUIT GROWERS' ASSOCIATION OF ONTARIO, 1895.



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TWENTY-SIXTH ANNUAL REPORT
OF THE
FRUIT GROWERS' ASSOCIATION OF ONTARIO

To the Honorable John Dryden, Minister of Agriculture :

Sir,—I have the honor of placing before you for approval the Twenty-Sixth Annual Report of the Fruit Growers' Association of Ontario. I believe you will find it to contain information of great value to Ontario fruit growers, on fertilization of flowers in orchards, fungi and insects and their remedies, new fruits, score cards for judging fruits, prevention of fraud in fruit packing, and numerous other subjects.

The interest shown in our Orillia meeting was unprecedented. Our work is enlarging on every hand to such an extent that our finances are taxed to the utmost to meet our requirements.

I have the honor to be,

Sir,

Your obedient servant,

Grimsby, January 7th, 1895.

L. WOOLVERTON,
Secretary.

OFFICERS FOR 1895.

PRESIDENT :

Murray Pettit..... Winona, Ont.

VICE-PRESIDENT :

W. E. Wellington..... Toronto, Ont.

SECRETARY-TREASURER AND EDITOR :

L. Woolverton Grimsby, Ont.

DIRECTORS :

- Division No. 1..... W. S. Turner, Cornwall.
- Division No. 2..... R. B. Whyte, Ottawa.
- Division No. 3..... George Nicol, Cataraqui.
- Division No. 4..... Wellington Boulter, Picton.
- Division No. 5..... Thos. Beall, Lindsay.
- Division No. 6..... W. E. Wellington, Toronto.
- Division No. 7..... W. M. Orr, Stony Creek.
- Division No. 8..... A. M. Smith, St. Catharines.
- Division No. 9..... L. Chapin, Brantford.
- Division No. 10..... J. A. Morton, Wingham.
- Division No. 11..... T. H. Race, Mitchell.
- Division No. 12..... Alex. McNeill, Windsor.
- Division No. 13..... G. C. Caston, Oraighurst.

AUDITORS :

A. H. Pettit Grimsby.
George Fisher..... Burlington.

CONSTITUTION AND BY-LAWS OF THE ASSOCIATION.

CONSTITUTION.

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

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

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

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

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

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

Art. VII. The said Officers and Directors shall prepare and present at the annual meeting of the Association, a report of their proceedings during the year, in which shall be stated the names of all the members of the Association, the places of meeting during the year, and such information as the Association shall have been able to obtain on the subject of fruit culture in the Province during the year. There shall also be presented at the said annual meeting a detailed statement of the receipts and disbursements of the Association during the year, which report and statement shall be entered in the journal and signed by the President as being a correct copy; and a true copy thereof, certified by the Secretary for the time being, shall be sent to the Minister of Agriculture within forty days after the holding of such annual meeting.

Art. VIII. The Association shall have power to make, alter and amend By-laws for prescribing the mode of admission of new members, the election of officers, and otherwise regulating the administration of its affairs and property.

BY-LAWS.

1. The President, Vice-President and Secretary-Treasurer shall be *ex-officio* members of all committees.
2. The Directors may offer premiums to any person originating or introducing any new fruit adapted to the climate of the Province which shall possess such distinctive excellence as shall, in their opinion, render the same of special value; also for essays upon such subjects connected with fruit growing as they may designate, under such rules and regulations as they may prescribe.
3. The Secretary shall prepare an annual report containing the minutes of the proceedings of meetings during the year; a detailed statement of receipts and expenditure, the reports upon fruits received from different localities, and all essays to which prizes have been awarded, and such other information in regard to fruit culture as may have been received during the year, and submit the same to the Directors or any Committee of Directors appointed for this purpose, and, with their sanction, after presenting the same at the annual meeting, cause the same to be printed by and through the Publication Committee, and send a copy thereof to each member of the Association and to the Minister of Agriculture.
4. Seven Directors shall constitute a quorum, and if at any meeting of Directors there shall not be a quorum, the members present may adjourn the meeting from time to time until a quorum shall be obtained.
5. The annual subscription shall be due in advance at the annual meeting.
6. The President (or in case of his disability, the Vice-President), may convene special meetings at such times and places as he may deem advisable; and he shall convene such special meetings as shall be requested in writing by five members.
7. The President may deliver an address on some subject relating to the objects of the Association.
8. The Treasurer shall receive all moneys belonging to the Association, keep a correct account thereof and submit the same to the Directors at any legal meeting of such Directors, five days' notice having been previously given for that purpose.
9. The Directors shall audit and pass all accounts, which, when approved of by the President's signature, shall be submitted to and paid by the Treasurer.
10. It shall be the duty of the Secretary to keep a correct record of the proceedings of the Association, conduct the correspondence, give not less than ten days' notice of all meetings to the members, and specify the business of special meetings.
11. The Directors, touching the conduct of the Association, shall at all times have absolute power and control of the funds and property of the Association, subject however to the meaning and construction of the Constitution.
12. At special meetings no business shall be transacted except that stated in the Secretary's circular.

13. The order of business shall be: (1) Reading of the minutes; (2) Reading of the Directors' Report; (3) Reading of the Treasurer's Report; (4) Reading of the prize essays; (5) President's Address; (6) Election of officers, and (7) Miscellaneous business.

14. These By-laws may be amended at any general meeting by a vote of two-thirds of the members present.

15. Each member of the Fruit Committee shall be charged with the duty of accumulating information touching the state of the fruit crop, the introduction of new varieties, the market value of fruits in his particular section of the country, together with such other general and useful information touching fruit interests as may be desirable, and report in writing to the Secretary of the Association on or before the fifteenth day of September in each year.

The President, Vice-President and Secretary shall be *ex-officio* members of the Board of Directors and of all committees. The reasonable and necessary expenses of directors and officers in attending meetings of the Board of Directors and of Committees shall be provided from the funds of the Association.

Local Fruit Growers' Association.

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

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

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

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

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

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

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

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

AGRICULTURAL DIVISIONS.

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

THE ANNUAL MEETING, 1894.

The Annual Meeting of the Fruit Growers' Association of Ontario, opened at eight o'clock p. m. on Tuesday, December 4th, in Shaftesbury Hall, Orillia, the President, Mr. T. H. Race, in the chair.

THE PRESIDENT'S ADDRESS.

BY T. H. RACE, MITCHELL, ONT.

In rising to deliver, what falls to my lot to-night, the thirty-fourth annual address of the President to the Ontario Fruit Growers' Association, I feel deeply impressed with the truth of Solomon's affirmation that there is nothing new under the sun.

After thirty-three of my predecessors have performed annually this task you may well wonder what there is left for me to say that has not already been said.

My immediate predecessor had the advantage of most of us and especially of me in coming, as he did, both before and after the great Columbian Exposition. In his address two years ago he had the great exhibition in anticipation. One year ago he had it all before him in its magnificent fulfilment.

Two years ago this Association had to consider what its duty was in connection with the fruit interests of this province at the great World's Exposition, and how best it could perform that duty. One year ago it need do little but talk of its achievements and the honors that it won there. And it will look back with pride to those achievements for many years to come.

But we are not depending for a justification for our existence on what we have done, nor shall we rest content at what we have accomplished. As an Association, we have steadily developed, and extended our operations and influence since the first organization, over thirty years ago, to the present time. We are bigger and better and stronger to-day than we were last year at this time, and we have a great future before us and a great work yet to do.

The fruit season just closing has had its disappointments, but they are not unmixed ones. Owing partly to the heavy frosts during the latter part of May and partly to the continued heavy rains immediately following, the great promise in the abundant show of blossom was not fulfilled in the crop of fruit; except perhaps in the one item of grapes. But while the apple crop has on the whole been short, prices have ruled high, and we have learned afresh the lesson, which we have hitherto accepted with more or less of doubting, that the Canadian apple of the right sort and quality need never lack for a ready market. It is gratifying to know that the apple grown in Ontario has established for itself a reputation in the markets of the old world that will insure it a sale in any quantities if properly and honestly handled. There is now no need for fear of over-production. The dangers to our apple industry in this province comes not from over-production, but from unsuitable fruit, bad packing and dishonest handling. We have much missionary work to do right here in this connection, and just how to accomplish that work, if Government inspection cannot do it, I am unable to suggest. It is

lamentably true that the good reputation which our apples have secured abroad has been largely neutralized by the distrust that has shown itself in our packers and handlers, and which we regret to say, is not altogether without cause. This defect must be righted and our efforts as an Association are invited in that direction and to that end.

We have a grand country to work in, and we know not yet the possibilities of our land as a fruit producing province. The experiences of every passing year adds to our faith in the magnitude of these possibilities. The markets of the great Northwest are opening up to us and demanding more and more of our fruit every year. The markets of the old world are ours if we but supply them honestly with the best we are capable of producing.

When Moses desired to learn of the character and capabilities of the land of Canaan he sent a deputation over to gather of its fruits. And when they returned, bearing with them samples of the fruit that they had found and gathered, Moses was satisfied, and longed to possess so goodly a land. We have in this Province of Ontario a heritage as rich as any land that Moses ever wished for, and we are well out of the wilderness that our forefathers struggled in before this association was born. And now that we possess in peace a land so good, of such vast possibilities, it is a duty that we owe to the Almighty who gave it, to our forefathers who brought it out of the wilderness, to ourselves who now enjoy it, and to our children who shall hereafter inherit it, that we possess it well and frugally, making it by our efforts to produce more abundantly of the fruits so natural to its soil and climate.

Figures and statistics are usually dry and uninteresting things, especially when brought into an address like this. But in turning to the Trade Returns I find encouragements to the labors of this Association, and valuable lessons also in the condition of things as shown there. Taking first the importations of dried fruits for home consumption, we find that in 1891 the value of such commodities brought in from other countries amounted to \$1,158,000. The following year it was down to \$1,000,000, and the year just past to \$900,000, decreasing at the rate of \$100,000 a year, which is largely, if not wholly due to the increased consumption of home grown fruits.

In the matter of dried apples alone, we imported in 1892 \$11,500 worth, and only \$1,500 worth in 1893, which goes to show that the evaporation of home grown fruit is enormously increasing, and that the home consumption is being supplied by the Canadian evaporator.

In the matter of green apples, we brought in for home consumption in 1892 \$81,000 worth, and only \$35,000 worth in 1893, and in the former year we sent out to other countries \$1,500,000 worth and in 1893 over \$2,500,000 worth. In 1891 we imported grapes to the value of \$79,000, and in 1893 the amount had been reduced to \$70,000, showing conclusively that we are supplying our own markets more and more with our own fruits in all the staple lines, and annually increasing our exportations to other markets in several lines. In the matter of canned goods the consumption of home grown fruits is steadily increasing, and the importation of canned fruit proportionately falling off. In 1891 we imported canned fruit to the value of \$73,000, and the amount had declined to \$61,000 in 1893, while the average exports for the past four years shows a steady increase.

Then turning to the nursery interests, we find something of interest there. In 1889 we brought in from other countries \$87,000 worth of apple trees for planting purposes. From that year to 1893, there has been a steady but marked annual decrease, until the amount last year reached only \$24,000 worth. And while this decrease has been going on in importations the matter of orchard planting has been largely on the increase, showing that the Canadian nursery industry has been keeping pace with the general progress in home developments. I mention these matters because I believe they all have a bearing on and a close relation to the effects and influences of the Ontario and affiliated Fruit Growers' Associations.

I recognize with grateful acknowledgments the generous aid that this Association is receiving from the Department of Agriculture in the Ontario Government, and also from the Department of Agriculture at Ottawa. The former has, through liberal grants of money, enabled us to establish testing and experiment stations at several points throughout the province, where a great variety of fruits are now being grown and tested, that their qualities and suitability to our varying soils and climatic conditions may be ascertained before being offered to the public for profitable cultivation. We expect to widen and develop this department of our work as fast as the resources placed at our command will admit of; and it is confidently hoped that the results obtained will prove of much value to the fruit grower and to the province—sufficient, we believe, to more than justify the expenditure and the labor involved. To the Department of Agriculture at Ottawa we feel grateful for the ready response to our requests for tests and experiments in spraying and other means for the destruction of the codling moth, curculio and sundry other pests that the fruit grower has to contend with. For these tests and experiments the season has not been a suitable one, owing to the constant rains throughout the spraying season, but under more favorable circumstances, or I might say ordinary conditions, much valuable and practical knowledge must surely result from these experiments.

Since we met together one year ago one of our number has passed, like a ripened fruit, away. We mourn to-day, in the death of our fellow director, Mr. David Nicol, one whose association we all enjoyed and whose wise and deliberate counsel we all valued. And this loss that we all feel to-day reminds us that we too belong to a great vineyard whose fruit is ever ripening and dropping off. David Nicol was one who devoted himself industriously to the cultivation of the beautiful in nature and to the improvement and development of all the choicest fruits capable of production in his adopted province. To labor in the vineyard of nature was to him a labor of love, and out of his labor came both profit to himself and instruction to his fellow man. Let us remember him for the good he has done, for the valuable services he contributed to the interests with which we as an Association are identified, and for the ennobling example he left us in his life and labors. He neglected not the cultivation of the spiritual vineyard, and when the harvest time came he was gathered like a ripe and golden fruit into the garner of the celestial mansion.

FIRST DAY.—EVENING SESSION.

ORILLIA, Tuesday, December 4th, 1894.

President RACE : Ladies and gentlemen and members of the Ontario Fruit Growers' Association.—We have met together again after twelve months to compare our experience along the lines which we have been pursuing for years in this province. I feel like congratulating ourselves upon the very favorable auspices under which we have met here this year. We are in a beautiful town, and we find that there is greater enthusiasm manifested here than in most places where we have met in past years. We are also favored to-night with the presence of quite a number of ladies in the audience, which is gratifying to us. We hope that to-night is an index of better things. We desire to cultivate those features in our meetings which will reach the ladies and interest them in the beautiful in nature. I fear sometimes that we have neglected that side too much. We have some papers from ladies during our sessions and I believe that these will tend to revive the interest in that line. We have a very full programme, and more than we will get through with in four days, so we will try to get on as hastily as possible with these papers. I shall now introduce Prof. Panton.

FUNGI.

Prof. J. H. PANTON, of the Ontario Agricultural College, Guelph, delivered the following address, in the course of which he made frequent reference to a chart of illustrations: The subject which was allotted to me for this evening is a discussion of the fungi, one of the most interesting and one of the most instructive groups in plant life at the present time. A few years ago very few knew anything about fungi, in fact it was almost an unknown word, and many even now may not understand what the word means. However, I hope that by the time I get through you will all have a true conception of the meaning of the word fungi.

This is a division in the plant kingdom the study of which requires the aid of a microscope. I have brought a microscope with me to-night. It does not seem a very large instrument, but is an excellent one for the size. I just mention this as some may think of purchasing one. It is made by Leitz, and magnifies up to six hundred diameters. An instrument like this would cost quite a sum a few years ago, but can now be purchased for about \$20. It is by means of a little instrument like this that I have been able to look into a great many of these obscure forms of plant life and bring out in detail on this chart how they appear under the microscope. You will notice that I have a chart before you, arranged so as to make my subject as clear as possible.

Rank. Where do the fungi stand in the plant kingdom? Now we find that when we look abroad in nature there are two large divisions of plants, viz. : the flowering and flowerless. Who ever saw a fern flower? You have never seen a mushroom blossom, you never saw a seaweed bloom. Fungi, too, never flower, and consequently they are what we call flowerless plants. Flowerless plants grow from what we call spores; flowering plants grow from seeds. All flowering plants started from seed; all flowerless plants started from spores. Among these flowerless plants I might mention seaweeds, ferns and mosses, but we shall not consider them. But there is another group called fungi and this shall engage our attention this evening.

Fungi start from spores. Now what is the difference between a seed and a spore? A spore is invisible. Why, this room is full of them! The air is swarming with them—they are all around us. If I were to leave a piece of bread exposed in this room for twenty-four hours, there would be mould upon it.

Seeds are visible. I do not think you can name any seed which we cannot see. They are all sizes. But spores are invisible, and we require a microscope in studying them. You may have the liberty during the session of looking through the microscope and seeing the spores on the gooseberry, etc. Then there is another difference. The spore has a very thin covering, but the seed always has a distinct covering. There is still another difference. In the spore there is no embryo, while in the seed there is.

You take a wheat grain and cut it, and in one part you will see the embryo or little plant, which is the point of germination. Take any seed and when examined you will always find a certain part we call embryo or young plant, but you never find an embryo in a spore. Another difference; when you put that little spore in the ground, germination is indefinite. By that, I mean that the spore has not a certain point from which it starts. Now, in the seed there is always a particular spot where the germ lies and from which the seed will start to grow.

The nature of fungi will now occupy our attention. Although not true for every one, yet I may make the general statement that in most cases after the spore germinates, it produces a lot of little threads. These interlace and pass in among the cells of the plant upon which the fungus is found, or among the material on which it grows.

Fungi either live on dead organic matter or upon living matter. It is not an uncommon thing for little suckers to dip down into the cells among which the thread-like structures grow. After a time in the history of the fungus spores are produced. As soon as that happens, you will find that from these little threads stalks grow up, each with a little round body at the end. That little structure may contain many spores inside of it. This is one of the ways a fungus produces fruit. There are a great many ways of producing fruit among the fungi, most of which are very wonderful and interesting.

There is a certain class, like the mushroom and toadstool, which grow on dead organic matter. They are called saprophytes. There is another kind, like the rust on the wheat and plum knot on plums, that live on living things; they are called parasites. We have considered the nature of fungi, let us now consider the third point in my chart.

The different kinds of fungi. It would take too long to discuss them in detail, but I shall endeavor to give you a general outline of the different types among these peculiar plants. There is nothing that comes home to the fruit grower more than the effects of these fungi upon his crops. I shall now refer to the different kinds, and avoid as far as possible the use of technical names.

The first are the slimes, more troublesome to the farmer than fruit grower, as they attack his turnips sometimes, causing the so-called "clubroot."

The next we notice is the great family of microbes. There are many forms in this group, which is now so much studied, because we find here the cause of many contagious diseases. It seems that we are surrounded on all sides by invisible enemies in the form of these microbes, all of which are exceedingly minute. We can overcome them by keeping in good condition, but if a person is in poor health he does not know at what time the microbe of typhoid fever or some other disease may take hold of him.

Some of these microbes are troublesome in the fruit growers' orchard. For instance, there is one that attacks the pear when affected with pear blight. These microbes are among the lowest forms of fungi. There is an oval type often associated with the rot. There is the unfortunate rod type that causes consumption. We find this not only associated with consumption, but also in a good many diseases. There is one that causes lockjaw; there is one that causes cholera, and there is also one that is often found in sewerage material. Each has a distinct shape and each disease has a specific form of microbe.

We now come to the moulds. If you take a piece of lemon and lay it aside for a few days in some warm place, like this room, you will find it will get covered with mould. Small stalks start up, little knobs grow at the end, each becoming full of spores.

Mildews may be divided into two types, the white and the brown. Let us first look into the white type of mildew. One is found on the grape and is called grape mildew. In this case you have all noticed that the under side of the leaf becomes covered with a web-like structure. If you take an affected leaf and cut a thin section and examine among the cells, you will see threads, and dipping down from these into the cells little suckers, which absorb nourishment from the host-plant. Out of the spores (*stromata*) in the leaves some five or six little stalks bearing on the end little round bodies, appear as the fungus develops. Now what happens? One of these oval bodies drops from the end of the stalk, if I may use the expression, and very soon after the contents commence to divide up, and roll out as rounded bodies. These develop a couple of hair-like appendages which enable the spores to move about to reach a suitable spot for develop-

ment. The spores cannot develop unless it is moist. This enables them to wriggle around until they find a suitable place for germination, and when that takes place you have the life history repeated as already described. Such is the mode of development seen in the mildew, which is known as the Downy Mildew of the grape.

Here is very much the same thing in the potato. (*Ill.*) The old fashioned rot in the potato is largely owing to the presence of mildew.

Now there are a great many mildews, the grape, pea, turnip, etc. Almost every plant we find has its specific mildew. Even on the plant Shepherd's Purse, we find a mildew, which in its general life history is the same as the mildews referred to on the chart.

Having discussed the white mildews, we shall now examine some of the brown. Here we find two types, one, which is external in its attack, growing largely on the surface of the leaf. We find another type internal growing within the tissues of plants. Probably the one with which you are most familiar is that which appears on the gooseberry. I have placed a very fine specimen of that under the microscope upon the table, which you may examine when you have an opportunity. When this mildew makes its appearance, you first see a greyish white powdery substance upon the gooseberry, resembling in form this figure. (*Ill.*) If you examine the other mildews, you will find the threads are not jointed, but when you come to this form the threads show partitions. As soon as the time arrives for the fungus to produce spores, it throws up little erect threads, presenting a jointed appearance. The last division falls off, then another, and so on, others growing in their places, until innumerable spores are produced. We see in this fungus a peculiarity; a class of spores appear at a certain part of the season and another class later on. Those about which I have been speaking are summer spores, the use of which is to propagate the fungus with rapidity. They grow in a very short time and thus the fungus spreads readily. The late spores, however, are longer in being produced, their object being to carry the disease into another season.

Later in the season the gooseberry becomes brown. If you take a small piece of this and put it under the microscope you will find any number of threads and minute brown nut-like structures. Let us look into these brown bodies and we shall find other minute bodies that are about the shape of an ordinary flask; each of these contains eight spores. The diagram before you represents the appearance of this fungus upon the gooseberry.

You will find almost the same mildew on the grape. It is what you call powdery mildew and it is also external. There is little difference except that the little brown nuts in the grape are surrounded by a number of hook-like threads. You will sometimes find a mildew of this nature upon the apple, but instead of hooks at the end of the threads you find little expansions, but much the same in other respects. These are among the most common types of what I have called external brown mildews.

We now come to some which are internal, and probably the one with which you are most familiar is the plum knot. I do not think that any of you here think that the plum knot is caused by an insect, but by a parasitic plant. In the spring of the year when the plum knot begins to form, you will notice that it has a velvety appearance caused by the presence of these little stalks sticking up with spores on the end of them. In February after the velvety appearance has passed away, if you take a very thin section of the plum knot, you will find it is almost covered with minute pimples. A thin section at this time shows small spaces containing many flask-like structures and in each eight spores. These are winter spores to carry the disease into the next season. Looking at the diagram you see that this fungus grows in the tissues of the knot, and you do not see it as you do the mildew on the gooseberry.

The ergot of rye has much the same life history. When this trouble gets into the rye it is a very dangerous thing to feed it to cattle. It produces disease and serious results follow.

Black rot of the grape is the same form and there are a great many others belonging to the type of external brown mildew.

Our next group embraces the rusts. We understand the nature of the life history of the rust on wheat, but as yet, have failed to get a good remedy. Here are a few diagrams illustrating the life history of the rust in wheat, and the rust that appear on the

apple and sometimes on the quince. The rusts have a peculiar life history. In the rust it takes two plants to complete the disease. There are several instances of this principle in the animal kingdom. It takes two animals to produce tapeworm, hog and man, or a cat and a mouse. A mouse develops it so far and when the cat eats the mouse, the tapeworm is developed in the cat. The same is true in the case of trichina, the hog develops it so far and man completes the development.

Now we find the same thing in plant life; wheat rust can go so far on your wheat, but the life history of the plant is completed on another plant; in some cases on the barberry. The apple rust cannot be developed on the apple alone. The spores get to the red cedar and there they develop what we call cedar apples. In the spring of the year you will observe on these apples peculiar structures like this (*Ill.*) and these develop something like you see here (*Ill.*) so that before you can have rust on the apple, you must have red cedars. It is therefore wise to destroy the red cedars.

We next consider the smuts. I do not think any of the smuts trouble the fruit grower, but they do the farmer. Here are some forms, (*Ill.*)

But as they are of more interest to farmers than fruit growers I pass on to the last group of the fungi.

Mushrooms. This is a comparatively harmless family. I am inclined to think there is likely to be a field opened up for enterprise in the cultivation of mushrooms. People are not only collecting them from meadows, but are beginning to grow them for profit. This group is one of the largest among the fungi. Now if you examine the soil in which mushrooms grow you will find it is full of thread-like structures, the vegetative part of the fungus, from this arises the so-called mushroom, which is really the fruit bearing part of the fungus; These thin gills beneath are covered with spore-bearing stalks. These spores as soon as matured fall into the ground where the mushrooms grow. The ground is full of them. We have now directed your attention to several groups of the fungi, viz: slimes, microbes, moulds, mildews, rusts, smuts and mushrooms, some of which are very injurious to the fruit grower.

Remedies. We have learned something about the nature of these fungi. What shall we do to destroy them? Thousands of dollars have been lost every year from the attack of fungi, but we are now learning how this may be diminished. From a study of the habits of the fungi we have learned we must depend upon prevention rather than cure. Many are located in the cells of the plants and beyond our reach, so that we must deal with them at an earlier stage. We should always, as far as possible, destroy all affected material. Some of you may have had your plums affected with plum rot. Affected plums left hanging on the tree have on them millions of spores, to be carried over to the next season. As soon as the warm weather arrives, these spores may be wafted about and thus cause any amount of plum rot. These should be destroyed. Examine the rot that attacks apples, you will see affected apples covered with spores which cause the disease. How important that they should be destroyed when seen!

Another principle that I would advocate in the prevention of fungi, is cultivation, so far as it aids in increasing the vigor of the tree. It is a very important thing to keep the plant in a healthy condition.

The third principle is the application of fungicides or fungi killers. This principle has been most emphatically demonstrated by many experimenters with fungicides. This is a list of the most common: copper sulphate and Bordeaux mixture (the same thing except that the latter has lime mixed with it); eau celeste (sulphate of copper, washing soda, with a little ammonia); carbonate of copper and potassium sulphide. But we have cut the list down until we have about one remedy for all, *Bordeaux*, so that we have now, I believe, a fungicide which covers nearly every case. There is one that is being largely used for the mildew of the gooseberry, Potassium sulphide, but the Bordeaux is the panacea for all; and every one should know what it is. It is simple sulphate of copper, lime and water. Some differ a little regarding the proportions, but a very excellent one is: five pounds sulphate of copper, four pounds fresh lime, and forty gallons water.

I believe the proportion, four, four, forty will prove equally successful, and is easily remembered, as one pound sulphate copper, one pound of lime, ten gallons of water.

Application. The point to be kept before us is not to waste material and do the work thoroughly. There are very many ways of applying the fungicides. We have spraying machines for this purpose. There is the little hand sprayer, the knapsack sprayer, the barrel, and the wagon with gearing. These are the machines we use. The form of nozzle used is of great importance; among the best are the Cyclone, the Vermorel. The latter is a very economical one, making an exceedingly fine spray. It is a little slow but does the work well. The Nixon has a sort of a sieve on the end of it, and throws out a strong spray. The McGowan is one which is very popular to-day. It is so graded that you can bring the spray down to a very fine condition, and there is little waste of material.

When to make the applications. Two before and two after blooming. What I mean by that is, first, in the early spring before the leaves buds swell, apply sulphate of copper in the proportion of one pound to twenty-five gallons of water, that is strong and as there is no foliage on the trees a little goes a long way.

In the case of grapes you may spray your grape-posts and trellis also, for some spores may be upon them. As the sulphate will burn the foliage and destroy it, consequently, after the foliage appears we should apply Bordeaux mixture, which is sulphate of copper and lime. The Bordeaux is applied before and immediately after blooming time, and again about ten days later. In other words, one application before foliage, one after foliage and before bloom, and two after bloom.

I have reached the end of the subject you so kindly asked me to discuss before you; but if there are any here who desire to ask some questions I shall be pleased to answer them as well as I am able. (Applause.)

A. M. SMITH: I would like to ask the Professor if plowing under leaves of a diseased grape would destroy it, or would there be any danger of the disease coming up?

Prof. PANTON: I think that if they were plowed in deep enough the spores would not likely reach the surface to do harm.

WM. ORR: At what time do the winter spores of plum knot fungus mature?

Prof. PANTON: About February.

A MEMBER: When do they propagate?

Prof. PANTON: They propagate in the spring.

A MEMBER: About what time do you assign to the maturity of the summer spores?

Prof. PANTON: About June and July, when the knot has a velvety appearance.

F. G. H. PATTISON: Do spores carry in the air?

Prof. PANTON: Yes; for they are so small that they may be readily carried about by the wind.

A MEMBER: Would there be any advantage in spraying in the fall immediately after the foliage has fallen?

Prof. PANTON: To some extent you may kill spores that are lying about.

A MEMBER: Is it a fact that fungicides have no effect upon spores after they germinate?

Prof. PANTON: I think they can if development is not gone too far so as to place the fungus beyond the reach of the fungicides.

A MEMBER: Do you consider that the black knot of cherry and knot of plum belong to the same species?

Prof. PANTON: Yes.

A MEMBER: Can you tell us anything about peach yellows?

Prof. PANTON: Not beyond that the cause is not known. The subject is now being studied by specialists, and as yet not much more has been learned than that it is contagious; but its cause has so far evaded research.

J. A. MORTON: I understood you to say in the course of your lecture that the potassium sulphide mixture is as useful as any other for destroying the gooseberry mildew. Now I have been taught that it is not. My experience with potassium sulphide thus far is that if you are not very careful it will dry up the leaves. I lost about half the leaves off my bushes after one application. Bordeaux mixture I consider a great deal safer. I have tried potassium three years, and Bordeaux mixture I have given only two years' test. Bordeaux is, in my experience, the safest and best remedy. This present year I have had no mildew on my gooseberries. Out of two hundred and fifty quarts I do not believe I had half-a-dozen gooseberries that showed any signs of mildew at all.

The SECRETARY: What kinds, Mr. Morton?

Mr. MORTON: All English varieties except Whitesmith. Before treating with Bordeaux mixture I had made up my mind to quit raising English gooseberries. One year, to test it, I treated one-half of my plants with Bordeaux mixture, and left the rest untreated. I do not advise anyone to do that from a commercial standpoint. The half not treated was badly mildewed, but the part treated with three applications of Bordeaux had no mildew. I can also corroborate what Prof. Panton has said with regard to the Bordeaux imparting a beautiful healthy appearance to the foliage. I found this in the case of the potassium sulphide, that, although I gave it as faithful a test as I did the Bordeaux, there would be patches which escaped the effect of the application. I think the Bordeaux acts more than by contact. Potassium acts only by contact. I also noticed that the foliage of my gooseberries that had been treated with potassium sulphide had not the healthy look that those had which were not treated. Perhaps that is the result in part of the treatment they had received the year before. But I will certainly require more proof and more experience to convince me to go back to potassium sulphide. Another thing about the potassium sulphide is that it is not the most pleasant smell to have about the place.

R. B. WHYTE (Ottawa): I have had considerable experience with fungicides for the gooseberries. I grow about thirty varieties; some are very subject to mildew. I agree with Mr. Morton that potassium sulphide has not been as successful with me as the copper carbonate. I use carbonate-ammoniacal solution. On those which were sprayed with ammoniacal solution there was no mildew; on those treated with potassium sulphide there was a great deal. But I find that the Bordeaux spots the leaves while the ammoniacal copper carbonate does not.

Prof. PANTON: The ammonia makes it a little more expensive.

Mr. WHYTE: A little.

Prof. CRAIG (Ottawa): I am pleased to hear the remarks of the last gentleman. I have been experimenting on the celery with very good results. The question of the gooseberry mildew has been pretty well settled, but our latest experience has corroborated the experience given by Mr. Morton that Bordeaux mixture has given us the best results in preventing the gooseberry mildew. When potassium sulphide was first recommended by the Farm we had not then tried Bordeaux mixture for this disease. Since that time we have found that by using a weaker solution of the Bordeaux mixture we have better results. I think with regard to the remedy which Mr. Fisher has suggested, that of sulphur, he refers more particularly to the powdery form of mildew. It is not so effective for downy mildew.

The SECRETARY: I think that we are very apt to become discouraged too soon with our spraying experiments. Because we do not see the results the first year we give up. I believe that next year we may see the results of this year's work, and so on from year to year, because we are increasing the vigor and health of the plants. Now, if any plant is stunted it cannot do much with fruit; you must get it into a healthy condition first. It may take a year or two to get your plants into a vigorous state of growth to produce fruit, and when in this state they are better able to resist mildew. We should keep on for several years, and then we will find that results are forthcoming. I wish to refer to a little experience in this line. There were twelve gooseberry plants (Whitesmith) in one row, and I have applied Bordeaux mixture for the last two years. Now they are very subject

to this mildew, and I was going to dig them out a year ago. I treated them with Bordeaux mixture all but one plant, but did not see very much difference that year. This year I treated the whole row, and the one that was missed last year was the only one that was affected with mildew this year, while those treated last year were clean. How do you account for that unless it was the two year's work?

Mr. G. C. CASTON (Craighurst): In picking apples this fall we found that certain conditions in the location had a great deal to do with the condition of the fruit. We found that when grown on rolling ground the apples were cleaner. The idea suggested is to plant trees on rolling ground, where they can get a good circulation of air.

A. W. PEART (Freeman): Does Paris green act as a fungicide as well as an insecticide?

Prof. PANTON: Some claim that it does, but we look upon it more as an insecticide.

FRAUDS IN FRUIT.

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

Notwithstanding that it has been remarked by one of the most prominent and observing men of our country that he never knew a man who was actively and energetically engaged in fruit culture to be a "mean man," I will venture the assertion that there is not another product of the soil through the medium of which there has been as many frauds practised as there has with fruit. From the time the Old Serpent fooled Eve with it in the garden down to the last apple packing, when all the best specimens were carefully placed in the end of the barrel that was to be opened, and the smaller ones dumped in the middle, somebody almost every day has been defrauded by it. My purpose is to mention a few of these frauds and leave it to the consciences of those who are present to decide whether they are guilty of any of them or not, and to have you suggest means, if you choose, whereby any of them can be prevented. The first I shall notice will be frauds practised by those who raise trees and plants for sale, the nurserymen and their agents, or in other words, begin at the root of the matter, for the first frauds they are guilty of is general, that of using roots or seedlings or seeds from unhealthy stock because they can get them cheaper, or in the matter of grafting apples or pears in cutting them up and making two or three trees from one seed, which by forcing may make trees large enough to sell but the vitality and fruit producing powers of which will be far behind a good healthy seedling, and in the matter of selecting seeds or pits, peaches for instance, many nurserymen get their pits from canning factories because they can get them cheap, though they know they are the product of trees where yellows exist and are liable to scatter and perpetuate that disease. But the temptation to fraud is not in using cheap stock alone. They frequently have on hand a surplus of varieties that are, from some cause, unsalable, or for which there is little demand. They may be at the same time short of some variety that is in great demand and that is hard to get. It is human nature if a man has an unsalable thing on his hands, I don't care whether it is a horse or a tree, to try and get rid of it and make the most out of it he can, and herein comes in the temptation to substitute. Nearly every nurseryman's, or agent's, blank orders have this clause in (though, by the way, not one man in fifty who signs it ever notices it), if "you have not got the varieties called for, you may substitute others you think equally desirable." Here is a chance to work off the unsalable stock, they think it would be equally desirable for them at least to work off this stock and let the buyer have it. And has he not signed the order giving them at least a legal right to do this. And there are tree agents that are far less scrupulous than this. I have known them to take orders from people for choice and rare varieties of fruits at extravagant prices, and then go and buy the cheapest trees they could find and label them according to the varieties called for and give them to their customers. And even agents of respectable firms are perpetrating frauds, nearly as bad, almost every day by selling trees that they know (if they know anything about fruit) will not grow to produce fruit but will be a

dead loss of both time and money to the buyer. I was up here in Muskoka 50 miles north of this a few weeks ago and saw trees planted out this fall of tender varieties, such as Greening and Baldwin apples, Bradshaw plums, Black Tartarian cherries, etc., that would not stand the climate here at Orillia, much less 50 miles north. What fruit grower is there that has not paid extravagant prices for new things advertized by nurserymen, which have proved to be of far less value than many old varieties they could get at half the price, or even positively worthless. But perhaps this is enough about the frauds of nurserymen and agents; every grower here will recognize them. But what about the frauds of the growers? Do they ever deceive in their fruit? Do their packages always contain the varieties and quality represented to their customers. Is every basket sent to market as good on the bottom as it is on top? Do all their quart measures hold two pints, or their peck baskets eight quarts? Do their 10-lb. baskets of grapes weigh 160 ounces? Are there any small or wormy samples in the middle of their apple barrels that ought not to be there? Do they ever, when they show fruits at fairs as their own growing, borrow or steal from their neighbors, or deceive the judges by getting two prizes for fruit of different varieties and pick it all off the same tree? I will leave them to answer these questions and pass on to those who sell fruits. The retailers have their reputation at stake and it would not do for them to deceive their regular customers much, and even though they do turn their berries over when they get stale to make them look fresh on top, and sometimes make mistakes in selling Belle pears for Bartletts, and other varieties of peaches for Crawford's, still they are usually pretty honest. But what about wholesale dealers and commission men? Are they always above suspicion? I have heard of some of the latter class that were not. They certainly have a great chance to defraud and I have heard of some who would take a commission from both buyer and seller and even sell at low prices to one another to speculate on. I hope, though, that this class is few, for it seems to me that if ever a man should be fair and honorable it should be when his fellow man puts confidence in him and entrusts him with property to dispose of and make returns for. And now a few words about manufacturers of canned fruits. I believe there are more frauds here than in any other department. I know there are many men in the business of canning, preserving and evaporating fruits that are above fraud, but the desire to make money is so strong in some they cannot resist the temptation. There is always a demand for certain varieties of fruit, such as Bartlett pears and Crawford peaches, and most people suppose when they buy a can of fruit labelled Bartlett or Crawford they have those varieties, but a large proportion of them are not grown on Bartlett or Crawford trees, but are some other kinds of white-fleshed pears and yellow peaches that are bought at a less price. But greater frauds are perpetrated in jams and jellies than in any other fruit preparations. The skins and cores of a large majority of the apples done up in canning and evaporating factories are ground up and made into cider, which with cheap sugar is made into jelly and flavored to imitate strawberry, raspberry, currant, quince, or any other kind of jelly, and put up in small pails and labelled and sold for such jellies. Some of our Yankee friends have even gone a little further and mixed hay and clover seeds with them and sold them for currant and berry jams. And how about wine makers? Do they ever make sparkling champagne out of cider, or pure native wines out of anything but grapes? I knew a man, a few years ago when grapes were not as plentiful as they are now, who made large quantities of what he called wine out of rhubarb, and at the same time some out of grapes. But he never sold anything but pure grape wine. Now, are there any frauds among the consumers of fruit. Do boarding-house keepers ever use any of these cheap jams and jellies because they are cheap, knowing them to be frauds? Do hotels ever use nice colored Ben Davis apples, Champion grapes, etc., on their tables because they will last longer than others of better quality.

I don't suppose any of you here will plead guilty to these frauds, but none will deny that they do exist. The question is, what are you going to do about it? Is there any remedy?

NEW FRUITS AT OTTAWA.

APPLES.

A paper on NEW FRUITS was read by Prof. John Craig, Central Experimental Farm, Ottawa :

McMAHAN WHITE: From A. L. Hatch, Ithaca, Wis. This variety has already been noted in the report of the Central Experimental Farm and I would again draw attention to some of its merits as an apple of value for regions where Northern Spy, Ribston, and Greening cannot be grown profitably on account of their inability to withstand the winter cold. It has proved, so far, a remarkably vigorous and healthy grower, free from any of the defects characteristic of varieties unadapted to this climate. It has borne moderate crops for the past two years. The fruit is large, smooth and attractive. Quality medium, season October to January.

SCOTT'S WINTER: From Dr. T. H. Hoskins, Newport, Vermont, U. S. This is an apple belonging to essentially the same class as the last in regard to the locality in which it should be cultivated.

The fruit is medium to small, handsomely colored ; quality only medium, its acidity being very pronounced. As a keeping variety it excels. Season, February to May for culinary purposes.

McINTOSH RED: I mention this to emphasize some of its strong as well as weak points. Tree fairly hardy ; quality first-class, appearance handsome, season that of the Fameuse or a trifle later, but like the Fameuse it falls an easy prey to the apple spot fungus (*Fusicladium*) and no grower should plant it without first making up his mind to deal vigorously with the enemy.

HAAS OR FALL QUEEN: So mentioned not for its value as a fruit, which is very slight—but for the use that can be made of it as a top working stock. For this purpose it possesses many desirable qualifications, and I believe it safe to say that Ribstons, Blenheims and Kings could be profitably grown on this with possibly increased fruitfulness in districts where they cannot be grown upon their own stocks.

WINTER DUCHESS: Has proved to be a handsome fall apple of fair quality, but will hardly compete with Wealthy, which comes in at the same season.

SALOME: Is a much advertised variety from Illinois. The tree is a round-topped, fairly vigorous grower, hardy at Ottawa. Fruit medium to large, round, green with rarely a blush. Mild sub-acid in flavor. An apple without striking characteristics, but evidently a keeper.

GIDEON: From Peter M. Gideon, Excelsior, Minn., U. S. Of the same parentage as Wealthy, but more vigorous in growth with larger leaves. The fruit is of the size of Wealthy, but much less highly colored. It holds to the tree better and may be considered nearly equal in quality. Where McMahan is grown this variety need not be included.

To attempt a descriptive list of all the Russian varieties which have fruited during the year would make an exceedingly lengthy catalogue, and with our present knowledge could not be of much value. A large percentage of the varieties in the test orchard have been seriously injured by blight during the past two years. Among the members of the Hibernial family, *Cross* from Voronesh, Russia, and *Romna* are handsome fall apples. The fruit is large, coarse in quality, but valuable for cooking. They bear heavily and annually.

LONGFIELD: Is making itself appreciated wherever planted on account of its early and remarkably heavy bearing habits. *English Pippin* is of the type and often confounded with this variety. Longfield is undoubtedly one of the best in quality of all the Russians. The fruit is medium or below in size, round, smooth and regular, yellow with a bright blush on one side. The flesh is white, crisp, sub-acid and good. Under favorable circumstances, as grown in the Province of Quebec, it keeps till March. As a home

use and near market apple it has great value. Like the Fameuse, it lacks the points which constitute the essential requisites for an export fruit. To obtain the best results the fruit should be thinned as the tree is likely to overbear.

Of the Russian apples imported as scions by the Fruit Growers' Association in 1890, I shall hope to make a report upon the fruit of many of these next year. *Sora-synap*, one of the most noted winter varieties, fruited as a top graft the past season. The specimens secured were disappointingly small. Of the shape and appearance of Ben Davis. Quality poor; season mid-winter.

PLUMS.

Of these I wish to draw attention to a few varieties which seem worthy of special reference.

HAWKEYE: (*P. Americana*) This has already been mentioned in a previous report to the Society, but no apology is needed for this repetition as it is proving quite equal to the task of making itself appreciated. The tree is a strong grower, which is characteristic of the type, and a remarkably heavy bearer. The fruit is large, round, handsome, purplish red; quality fair. The skin is thick enough to allow of its being marketed in good condition. Season, the middle of September. It should be planted where DeSoto is thought desirable.

STODDARD: (*P. Americana*) From C. G. Patten, Charles City, Ia., U. S. Answers to same general description as the last, but is somewhat later in ripening. Among the Russian plums which have fruited two varieties, so far, are worthy of trial.

(1) **MOLDAVKA:** This was obtained from Prof. Budd, of Iowa, in 1888. The tree is a round topped, fairly vigorous grower. Shoots large, of a purplish color. It has not been injured by winter so far as have many of the other varieties of *P. domestica* in the test orchard.

Fruit large, one and three-quarters by one and five-eighth inches, oval and somewhat pointed, color dull brownish purple, covered with thick, blue bloom. Stem short, stout, set in a deep round cavity; suture terminates in a protuberance on one side. Flesh greenish yellow, moderately firm and juicy, mildly sub-acid, not highly flavored, but of fair quality. Pit medium size, oval, firmly attached to flesh. Ripe, September 5, 1894. Thus far it has not proved a heavy bearer.

EARLY RED: (*P. domestica*) From Prof. Budd. Tree of slow growth, twigs slender, leaves small, hardy. Fruit medium size, oval, dark red with blue bloom. Flesh greenish, firm, juicy; quality fair to good. Pit firmly attached. This variety has borne light annual crops for three years, and appears promising for the north.

CHERRIES.

I have to report in this connection that the trees of Koslov Bush Morello, imported by the Association, a portion of which were placed in charge of the horticulturist at Ottawa, have proved hardy, but exhibit considerable variation in habit of growth and character of leaf and bud. A few blossoms last year, but set no fruit. A large number blossomed the past season, and some fruit matured. An examination of the blossoms disclosed the fact that many of them possessed abortive stamens, which may account for the fruit setting very lightly. Samples secured were of small size, bright red, heart shaped, flesh soft and rather astringent. Pit large, altogether not promising so far. But it is not fair to base an opinion on first fruits. I may say that Dr. Charles Saunders succeeded in crossing this with other forms of the Morello, and interesting results may be looked for from this union.

Most of the Russian and German cherries described in Bulletin No. 17 of the Experimental Farm, have realized our expectations in regard to hardiness and productiveness. The varieties specially recommended are being planted to a considerable extent, but would be more generally cultivated if the trees were easily obtainable.

GRAPES.

The past season was one of the most favorable for the thorough ripening of this fruit which has occurred within a decade. Fungous diseases were not severe, and were easily controlled with Bordeaux mixture. At the Central Canada Exhibition, held during the last week of September, 142 varieties were shown, of which number seventy-five were well ripened.

FARRELL: A white grape, mentioned in the report of the Association last year, produced in abundance enormous bunches of fruit upon vines planted three years ago. The berries, which I said were small last year, were much larger this season, and while the fruit did not reach perfect maturity, yet it gave assurance of good quality. It should be tested in our best grape growing districts.

BRILLIANT: Of T. V. Munson, a cross from Delaware and Lindley, is a promising red variety for home use. It does not seem sufficiently vigorous or productive for market. But our vines are yet young.

PEABODY: A seedling of Clinton, raised by J. H. Ricketts, is by no means a new variety, but is mentioned here with a view of dilating on its good points.

(1) It has borne heavily and has not been affected by mildew, though to a slight extent by anthracnose.

(2) The fruit ripens every year at Ottawa, and the berry holds well to the bunch.

(3) Bunch large, well shouldered; berries medium size, black oval; quality first-class, combining a sprightly acid with a rich vinous flavor. After eating fruit of Niagara or of the Rogers varieties, a bunch of Peabody is positively refreshing.

SECRETARY: Produced by J. H. Ricketts, Newburgh, N. Y., by crossing Clinton with Muscat-Hamburg. This variety yielded remarkably fine bunches the past season.

Bunch and berry medium size, the latter oval; skin moderately thick; pulp very meaty and of an exceedingly pleasant acid. Seeds small, two or three in each berry. On account of its meaty character of flesh, it keeps well. This variety combines in a remarkable manner in both vine and fruit, the good qualities of the European and American grapes. It is not likely to become commercial. It ripens with the Delaware.

MILLS: Might be classed with it.

RASPBERRIES.

As a market berry nothing better among reds than Cuthbert has yet appeared. Gladstone, Superlative, and Beaconsfield of the *Rubus Idaeus* or European class have fruited, but do not appear promising, and will no doubt remain in the amateur list on account of lack of productiveness.

Of black caps, Older, mentioned last year, easily retained first place, both for productiveness and quality. The plant is also more easily kept in form than other members of this division.

STRAWBERRIES.

One hundred and ten varieties were tested this year. The following varieties gave the largest yields, and are named in order of productiveness: Crescent, Beverly, Jas. Vick, Warfield, Stayman's No. 1, Van Deman, Williams, New Dominion, Beder Wood, Haverland, Parker Earle, Bubach. Each variety consisted of a row sixty feet long. The highest yield was 40 boxes and the lowest 24, of the varieties mentioned.

TIMBRELL: Gave promise of productiveness. It is early, of fair quality and moderately firm, but its very dark colour is against it as a market berry. The plant seems quite vigorous.

ENGLISH GOOSEBERRIES.

In closing this hasty review of the newer fruits, I would like to call attention to a class of small fruits not new, but unfortunately frequently overlooked. I refer to the

English Gooseberry. This has been a neglected fruit partly on account of unadaptability to all soils, and partly owing to its susceptibility to gooseberry mildew. Now that this disease can be cheaply prevented by spraying, and given a patch of clay or heavy loam, there is no reason or no excuse for slighting this luscious fruit. Gooseberries stewed, gooseberries in jelly and gooseberry tarts are all very nice in their way, but are not to be compared with well ripened berries in their natural state. Plant them on clay soil, where the snow lies deeply; spray and reap your reward, which will surely come.

A. M. SMITH: Have you tried any Japan plums at Ottawa?

Prof. CRAIG: Yes, we have tried them. When the plum orchard was first set out all the varieties then distributed were planted in it. They all died out within three years excepting one variety which lived and bore fruit for two years, and then died.

A. M. SMITH: Do you know the number of the plum?

Prof. CRAIG: This variety has since been identified in New York state and distributed under the name of *Willard*. It is one of the earliest of all the Japan plums.

MEMBERS: Have you experimented with blackberries.

Prof. CRAIG: Yes, we have about thirty under list, but we find it necessary to lay them down in winter, to get the best results.

APPLES FOR NORTHERN ONTARIO.

BY MR. J. H. TOOL, OF ORILLIA.

I see by the programme that I am expected to advise you as to what would be the best kind of apples to plant in Northern Ontario. If my memory serves me right it was for this locality—East Simcoe—that I proposed to speak. I was never in *Northern Ontario* and an apple which might do exceedingly well here might, and very likely would prove a failure “up North.” We hardly like to have it said that Orillia is in Northern Ontario; but I do think that we are just in about the right spot to grow apples for Northern Ontario, and the fruit table that we present to this meeting of the Association shows that we only need to plant and grow the right kinds to be able to supply not only Northern Ontario with choice apples, but also to send a good many into the more southern sections of the Province. Since I have taken an interest in our Horticultural Society the quality of the fruit shown at our fall fair has improved at a wonderful pace with—as regards apples—a corresponding increase in the quantity and also in number of standard varieties; there is still room for improvement not only in quality but for a much greater quantity. The great mistake that has been made here is in planting too many summer and fall apples and going in for everything that is new and high-priced, especially if the nursery agent claims it to be something extra. I am not driving at friend Fisher now, I do not think he is any worse than the rest of the agents.

But, now that we have the Experimental Stations I suppose that in a few years we will be able to now just what to plant in every section to give the best results, especially if the Government will pass a law that no new kinds shall be sold as *first-class* kinds until they have been thoroughly tested at the stations and proven to be worth planting. I will now just speak of a few kinds of apples that apparently are doing well in this locality: In fall apples the “Duchess” does the best of all, but we already have too many of them planted, it is, however, an excellent tree to graft less hardy kinds on. The “Wealthy” is doing exceedingly well and bears early, being later than the “Duchess.” I would prefer to plant it largely; the “Wealthy” keeps *well* until the middle of December; in the Association’s tables it is classed as a winter apple; this should be changed. The “Snow” suits this locality well, quite hardy and bears well, but the last few years it has been liable to scab pretty badly; I have used the *Bordeaux* mixture on mine this year with fair results. The old “Colvert” is hardy, a good bearer, and almost becomes a winter apple when grown here; it is a first rate fall apple for this locality; I think that is about as many fall apples as it is desirable to plant. The great trouble in grow-

ing winter apple trees here is, I believe, in the way our winters come on ; the ground is seldom frozen to any depth, before it is covered with snow—and often the ground is soft all the winter—then in spring growth starts too soon and trees are killed. It is not “winter killed” with us, but “spring killed ;” and all trees that grow late in the fall are pretty sure to get nipped either with a sudden coming on of winter or too early growth in spring. The “Golden Russet” and “Roxbury Russet” are both doing well here ; the “Ribston pippin” does fairly well and no orchard should be without it. There were some very fine “Blenheim Orange pippins” shown here this fall, the owner says the trees bear well. The “Taiman Sweet” does well and is an excellent tree to graft other kinds on that are not so hardy. We have had some fine samples of the “Wagener” shown at the fair, it is a choice apple, but I do not think it is hardy enough for here ; I had two trees, they both “winter killed ;” but I have some fine grafts of it growing in a “Duchess.” I might say I have 30 or 35 different kinds of apples grafted as an experiment, but only two or three of them have yet commenced to bear. Of the newer sorts that are bearing in this neighbourhood the best in my estimation is the “Pewaukee,” it is a fine hardy tree, bears every year with me, and I consider it a choice apple. The “Mann” is just beginning to bear, a very fine looking apple, the trees appear to be hardy and thrifty and I think it will be worth planting. The “Fallwater” is another just coming in, a very thrifty growing tree, and a beautiful apple ; and if it does not prove to be a shy bearer, should be in every orchard. The “Ben Davis” does exceedingly well here, sells first-class so far, and on account of its good bearing and keeping qualities is a desirable tree to plant. The “Twenty-ounce pippin” does very well and is a good keeper for a fall apple and rather desirable to plant. There is one more that I wish to speak of, it is all right in quality, the tree is hardy, a thrifty grower and bears every year, but as to size and appearance, *there it is* : (it is the “Wallbridge”) about as good-looking and as big as they can be grown about here, and if that is the best that can be done, one tree is enough for anyone to have—it was boomed by the nursery men, 8 or 10 years ago and a good many were planted.

If every farmer in East Simcoe who has 50 or 100 acres would plant 5 or 10 acres to orchard, of 5 or 6 of the best sorts I have named above and take care of them when planted they could say in 12 years from now that I gave them the best advice, at the Fruit Grower's Association meeting in Orillia, that they ever had and all for nothing.

The Secretary read an invitation from the Medical Superintendent of the Ontario Asylum for Idiots to the Association to visit that institution during the time of the members in the town.

SECOND DAY.—MORNING SESSION.

WEDNESDAY MORNING, 11 o'clock.

A paper on “How may the membership of the Fruit Growers' Association of Ontario be increased,” was read by Mr. Thos. Beall, of Lindsay.

THE MEMBERSHIP OF THE FRUIT GROWERS' ASSOCIATION OF ONTARIO SHOULD BE INCREASED.

By THOMAS BEALL, LINDSAY.

To those who have given the subject due consideration, it seems incredible that the Horticultural Journal and Annual Report of this Association, when it contains so much useful information to fruit growers, whether they be villagers having their quarter-acre lot, or orchardists having large farms, should have such a limited circulation. The membership, which is little over 2,000, should, and may be increased in a few years to ten times that number.

Upon a careful survey of the subject for the purpose of finding some way of materially increasing our membership, it has been found that the means by which it may be accomplished is already provided in the Agriculture and Arts Act.

The provisions of the Act relating to this subject are upon such broad and liberal principles that the reader of the Act may well be astonished that every township and horticultural society in the province has not, long ago, become affiliated with this Association. Sections 46, 47 and 48 provide for the organization and maintenance of township and horticultural societies in a liberal manner. It is quite evident, however, that the officers and members of these societies have generally given no attention to the provisions of the Act relating to the several purposes to which the money may be applied, and I here copy in full sections 37, so as to give its provisions prominence.

"37—(1) The objects of the said societies, and of the township societies in connection therewith, shall be to encourage improvement in agriculture, horticulture, manufacture, and the useful arts."

"(a) By holding meetings for discussion and for hearing lectures on subjects connected with the theory and practice of improved husbandry or other industrial processes."

"(b) By promoting the circulation of agricultural, horticultural and mechanical periodicals."

"(c) By importing and otherwise procuring seeds, plants and animals of new and valuable kinds."

"(d) By offering prizes for essays on questions of scientific inquiry relating to agriculture, horticulture, manufactures, and the useful arts."

"(e) By awarding premiums for excellence in the raising or introduction of stock, the invention or improvement of agricultural or horticultural implements and machinery, the production of grain and of all kinds of vegetables, plants, flowers and fruits, and generally for excellence in any agricultural or horticultural production or operation, article of manufacture or work of art."

"(2) The objects of horticultural societies shall be the same as those of district and township agricultural societies, but in relation to horticulture and arts only."

It is evident, therefore, that there are five ways in which the funds of these societies may be used; these may be summarized as follows, viz:

1. By holding meetings for discussing and for hearing lectures on subjects, connected with the objects of the society.
2. By promoting the circulation of agricultural and horticultural literature.
3. By importing and otherwise procuring new and valuable seeds, plants, etc.
4. By giving prizes for essays on subjects connected with the objects of the society.
5. For holding exhibitions and awarding premiums for things connected with agriculture, horticulture, etc.

The fifth and last sub-division—that permitting the holding of exhibitions—is the only one generally acted on, but it must be apparent that if the funds were expended as provided by either of the other sub-divisions, or partly under all of them, the expenditure would be as legal as under the fifth.

It is difficult to understand why towns and villages have not further availed themselves of the provisions of the Act and established horticultural societies in their midst, except on the supposition that the directors of such societies supposed they had of necessity to expend the funds in holding exhibitions, and in no other way, while they knew that but little or no public good has resulted for many years from such local exhibitions: and this applies also to many of the township societies. Not to all: some of them are yet doing good work.

There are, however, many other reasons why so little interest is taken in township and horticultural societies under the present prevailing system of management. It is well known that the labor and care of managing such exhibitions devolves mostly on the same persons from year to year in each society, and they must also expend much time

every year in begging their fellow-citizens for their membership fees. Not a pleasant job at best, and this unpleasantness is greatly increased by the knowledge that but comparatively few of the members partake of the pecuniary benefits resulting from such exhibitions. Those who receive the prize money generally render the least assistance.

The suggestions offered as a remedy for this state of affairs are: That township and horticultural fairs or exhibitions—as a rule—should be given up, and that the provisions of the Act be so administered that each and every member of such societies should receive equal advantages, and this can be done by expending the societies, money as provided by any or all of the first four sub-divisions of sub-sec. 1 of sec. 37 of the Act. By referring to these sub-divisions and to sections 58 and 59, it will be seen that under intelligent management every member of all such societies may also be a member of the Fruit Growers' Association which will entitle him to the Horticultural Journal for one year, bound copy of the report and a share in its distribution of plants, etc. He may also receive two or three dollars' worth of the choicest plants, bulbs, shrubs or trees procurable; all for the usual fee of one dollar, and the directors should still have funds on hand sufficient to defray the cost of holding two or three meetings each year for discussing local agricultural and horticultural matters.

If these suggestions are carried into effect the Fruit Growers' Association of Ontario will very soon number 10,000 members, and who can estimate the benefits which would be derived by the circulation of so many thousands of copies of our publication amongst an interested agricultural population? At present the circulation of our journal is mostly confined to our towns and villages. The agricultural population—those who are most in need of the information sent out, are not yet reached.

When the agricultural population of that portion of Ontario embraced between the 44th and 45th degrees of north latitude become fully aware of its possibilities for the production of fruit, and have proven by practical experience that in this belt there can be profitably produced the best winter apples on this continent; then the province of Ontario will become known as the best home for the surplus Anglo-Saxon race on the face of this globe.

The SECRETARY: I am inclined to think that we as an association approve of the lines laid down by Mr. Beall in this paper, and approve of the exertions of the executive committee in carrying out this plan to a certain extent. This has been tried during the last year or two and where the local organizations have been formed under this scheme, they have worked most successfully, and appear to be permanent organizations.

Mr. RACE: You have formed several local societies in this vicinity, have you not?

Mr. BEALL: I have excellent societies, at Lindsay and Port Hope.

REPORT OF AFFILIATED SOCIETIES.

The SECRETARY: There are several affiliated societies, and we have not sufficiently recognized their existence in a public way. We want delegates from those societies to come to our meetings and tell us what they are doing. To-day we have two representatives from the Burlington Horticultural Society, Mr. Geo. Fisher and Mr. A. W. Peart.

Mr. PEART (Burlington): I may say that our Burlington Horticultural Society was organized some five years ago, in 1889. The first year we had a very small membership, probably fifteen or sixteen, but from that time down to the present, we have been gradually increasing, until now we have over seventy members in good standing. I may say that we are not organized under the Agriculture and Arts Act, although we are affiliated with the Fruit Growers' Association. One reason is that the majority of the fruit growers in that district live in the township of Nelson, and one of the provisions of the Agriculture and Arts Act is that the majority of the directors of an Association must live within the municipality of the village or town, as the case may be. I will point out another difficulty; for instance, we have different departments of fruits and a director

for each department, a director for pears, etc. At our annual meeting it is the duty of each director to give a report on his particular department for the past year. I think you will all agree with me, that it would be rather difficult for us to organize under the Agriculture and Arts Act. I do not know that I have anything else to report. Our society is strong and is growing all the time. We have to compete with other societies, as the Nelson Agricultural Society and the Farmers' Grange, but with a little effort we increase our membership. We send in at least fifty names to the secretary of the Fruit Growers' Association of Ontario.

The SECRETARY: You have frequent meetings?

A. W. PEART: We meet four times besides the annual meeting. The annual meeting is held on the last Tuesday in January. We have papers or addresses given by practical members of our Society and followed by discussion. We consider that this local association is a grand thing. There is no doubt that the formation of the Burlington Horticultural Society has stimulated the fruit industry in that locality.

The SECRETARY: You might mention the papers you have had this last year.

A. W. PEART: This last year we have considered the subject of spraying, the apple-crop of last year in its different bearings, the extent of crop and quantity of fruit. This was applied to all the different fruits. Then we have had papers on current culture, black knot, and I may say here that in our township we are taking vigorous steps to stamp out the plum knot. We have taken advantage of the new Act concerning the knot and have had two inspectors appointed for the township of Nelson. The black knot is about running our cherry trees. A few years ago the black knot swept through that part of the country ruining the plum trees, but did not touch the cherry trees. New plum trees are now being planted out, but red cherry trees are dying from the effects of black knot.

Mr. RACE: That seems to raise the question: Is the fungus the same on the plum and the cherry?

Mr. PANTON: The same fungus causes both. It is a disgrace for anyone to allow it to spread. Wherever a knot is seen, it should be destroyed at once.

Mr. C. L. STEPHENS (Secretary Orillia Horticultural Society): Our society which was established about eight years ago, is not conducted along the lines laid down by Mr. Beall. The exhibits of fruit at our fall fairs have increased five hundred fold, both in quantity and quality of fruit. We get just enough members, chiefly in the town, to enable us to draw a government grant. We then affiliate with the electoral society and throw all our funds into that, but retain control of them. We have not affiliated with the Fruit Growers' Association, but it is our intention to do so.

Mr. RACE: Mr. Beall made the statement that the publications of our Association was limited largely to towns and cities. That is true to a large extent, but I find this, that wherever our journal has circulated there is a more lively interest taken in fruit growing. Mr. Stephens has given us a new idea in uniting, as they have done, with the district Association, for by that means they are able to give larger prizes which is more encouragement to the farmers to bring out their fruit.

REPORT ON GRAPE CATALOGUE, 1894.

The SECRETARY: Mr. President, I propose that we take up the grape catalogue. Mr. M. Pettit, as one of the experimenters, in his report does not agree altogether with values given in our catalogue. It is quite open to this meeting to make any changes. Mr. Pettit will suggest some.

Mr. M. Pettit here read the following list of proposed changes:

The Executive Committee, of Winona Experiment Station, viz.: Messrs. M. Pettit, Wm. Orr and L. Woolverton, with Mr. A. M. Smith, director of adjoining district in

consultation, after carefully comparing the report of this station on varieties of grapes with grape catalogue, published by the Ontario Fruit Growers' Association, have decided that the values of certain varieties in the latter should be changed as follows :

Varieties.	Catalogue Value.		Change Recommended.	
	Table.	Market.	Table.	Market.
August Giant	1	3	5	5
Barry	5	6	7	7
Catawba	9	8	9	9
Creveling	6	3	6	4
Dracut Amber	1	7	2	4
Duchess	1	7	5	6
Eumelan	6	4	6	5
Lady	7	5	8	8
Massasoit	6	5	6	7

The minor discrepancies between the Experiment Station report and that of our catalogue, we think it unnecessary to attempt to harmonize, because a little difference in the absolute value of a grape is observable in various soils and climates.

Mr. M. PETTIT: I might just say that in giving the table value of these grapes, that they are judged from the standpoint of grapes grown on clay soil, which makes considerable difference in the flavor. August Giant, a cross between Black Hamburg and Marion. A very showy grape for the table, and, with me, of good flavor. I would consider it marked entirely too low as a table grape. I would raise it to five for a dessert grape.

Mr. R. B. WHYTE: I think that the general experience would be against five for dessert. On light soil it is not good. If it is equal to five on clay soil, and two on light soil, we had better give it the average.

Mr. PETTIT: The Barry is equally as good as the Wilder which is considered one of the best of Rogers black, both in flavor and shipping qualities. Catawba is one of the choicest grapes we have. In the market it outsells any other grape.

Mr. McNEILL: I would object a little to the market value. In the London market last October I could only get 3c. for the finest Catawbas, while Niagara, and other grapes were selling for 4c. I also received a telegram from Ottawa that they were not selling well there.

Mr. PETTIT: I cannot understand that; I sent Catawbas to Ottawa at 5c. f. o. b. There has been no year for the last ten years when my Catawbas have not brought me at least 5c. a pound. Dracut Amber is a very poor flavored grape. Duchess is a good grape. It is in white what the Delaware is among red grapes, and is marked too low.

A. McNEILL: You have different taste. I would not consider it worth more than two or three at the most.

M. PETTIT: The Eumelan is an early black grape and ripens before Concord which makes it valuable in the market. Lady is the first white grape in the market. It is a good flavored grape. It is also a choice dessert grape.

THOS BEALL: Do you think it should rate higher than Jessica for table use.

Mr. PETTIT: Yes. It is a more showy grape, and better in flavor to my mind.

The SECRETARY: In moving that as an Association we approve of Mr. Pettit's report, I might explain that Mr. Pettit, as one of the experimenters appointed by the Board of Control of the Ontario Fruit Experiment Stations, in making out his excellent report, does not agree in the values of some of the grapes with the published report of our Association, and, in order to harmonize them as far as possible, he has suggested these changes.

A. M. SMITH seconded the motion.

A. H. PETTIT: We are continually changing these standards. Why would it not be well to name experimenters in the southern, western and northern districts and have these representatives meet here on one of the days of our meeting and bring in a report for the several districts.

The SECRETARY: Allow me to say that Mr. Pettit and Mr. Caston have met and agreed upon the changes now before us.

The motion was carried.

APPLE AND PEAR CATALOGUE.

The SECRETARY: Mr. President, the report on changes in apples and pears will be given by Mr. Caston. There are four stations established and one of them is at Craighurst and is devoted to apples and another at Trenton devoted to apples and pears. There two experimenters have met and agreed upon the following report:

RECOMMENDATION FROM EXPERIMENTERS CONCERNING FRUIT CATALOGUE.

We, the experimenters of the Fruit Experiment Stations of Ontario, having considered carefully the values of certain varieties of apples and pears, recommend the following changes:

Varieties.	Dessert.	Cooking.	Home.	Foreign.
Buffam pear.....	5	.....	4	
<i>Apples.</i>				
Tetfsky.....	7	9	6	0
Tolman Sweet.....	6	5	3	4
St. Lawrence.....	7	8	8	5
Hurlbut.....	8	8	8	8
Fameuse.....	10	5	10	8
Grand Sultan.....	5	8	6	6
Benoni.....	10	8	4	7
Ben Davis.....	1	3	8	9
Beauty of Kent.....	6	6	8	7
Bailey Sweet.....	4	8	4	4
Duchess of Oldenburg.....	6	10	10	10
La Rue.....	4	9	8	8
Colvert.....	3	9	7	8
Maider's Blush.....	3	8	9	8
Pewaukee.....	6	8	8	8
McIntosh Red.....	10	7	7	8

Signed,

G. C. CASTON.
W. W. HILLBORN.
W. H. DEMPSEY.
M. PETTIT.

Mr. CASTON: In the list the Ben Davis apple is not rated at all for dessert. A great many shippers through the country would tell you that they make more money out of Ben Davis because of its color. The tree bears early and abundantly, and stands shipment to England better than any other apple.

A. H. PETTIT: In Wisconsin, its native country, it is rated very low. It is not a dessert apple.

J. A. MORTON: I object to putting it at 5 for cooking when you give the Baldwin only five for cooking. The Baldwin is a better apple than the Ben Davis, although neither of them is a very good keeper.

A MEMBER: My opinion of Ben Davis is that you cannot eat it at all. It is a wooden apple, but I am told it is a good shipper and that it will keep until June.

A. MCNEIL: The Ben Davis in January or February is a good apple, and certainly equal to the Baldwin. We have not an apple growing section (Windsor); our apples mature too soon. We cannot grow winter apples, and it is possible that the Ben Davis may be a different apple with us, but certainly in its season it is good.

Moved and seconded that it be raised one point for dessert. Carried.

W. H. DEMPSEY: I think it is quite right that for some parts of Ontario the Ben Davis should not be estimated any higher, because I do not think it is good in flavor in any place except the eastern and northern parts. The Ben Davis is really better than many people think, but a great many people have got prejudiced against it. I rate it three for cooking.

Mr. A. H. PETTIT: You have decided that the Ben Davis is worth one for dessert, three for cooking. Now for home market it is valued eight. I think you must cut that down a little.

J. A. MORTON: I do not think the quality should be considered in estimating its market value. As people become educated enough to know it, it may make a difference. The question is, compared with other apples what is its value.

A MEMBER: I saw a barrel of Ben Davis sold for \$4 in the town of Lindsay. I would say it is a good apple for the home market.

G. C. CASTON: The Duchess of Oldenburg we would raise from two to six for dessert, ten for cooking, ten for home market and ten for foreign market.

Mr. MORTON: Do you think that ten is rather high for foreign market?

Mr. CASTON: Possibly so.

The SECRETARY: Mr. Shepperd, of Montreal, shipped this apple to England, in the Cochrane case, and received a very high price for it.

A MEMBER: Mr. Allan told me that he sold them in England at 18s. 6d.

Mr. CASTON: I might sum it up as the very best apple introduced into Canada. We next have La Rue. We suggest four for dessert, nine for cooking, eight for home market and eight for foreign market. It is a splendid cooking apple. It is really not a good dessert apple as it is rather too large.

Mr. CASTON: Pewaukee, we have put it at six for dessert, six for cooking, eight for home market and eight for foreign market. I presume a good many people do not know this apple in its right season.

J. H. TOOL: I do not think you have marked it high enough for dessert. I move that it be put eight for dessert.

J. A. MORTON: I think that is too high. One thing against it is the looks of the apple. It is too big and has an irregular shape. Two elements should be taken into consideration, not only quality but also the appearance of the apple. I do not think it is up to the standard in quality. I think it should be valued at six.

This was agreed to.

Mr. CASTON: The Fameuse we have valued at ten for dessert, eight for cooking, nine for home market and ten for foreign market.

J. A. MORTON: If you are giving the Fameuse ten, what are you going to give the McIntosh Red. Every one that I have heard speak of them places the McIntosh Red far ahead of the Fameuse.

A resolution was duly passed, rating the Fameuse ten for dessert, five for cooking, ten for home market and eight for foreign.

Mr. CASTON: There is no apple yet that takes the place of Fameuse as a dessert apple. Talman Sweet we put at six for dessert, nothing for cooking, three for home market and four for foreign market. My experience is that you cannot sell it at all.

A. M. SMITH, St. Catharines: It is one of the best baking apples. The Dutch use it largely for apple butter.

Mr. RACE, Mitchell: I buy more Talman Sweets every year than any other apple and use it for baking.

Mr. SMITH: I move we accept these changes except that for cooking it be raised to five. (Carried.)

A MEMBER: I move that the McIntosh Red be raised to ten for dessert. It is one of the best apples we have for dessert.

Mr. WHYTE: It is a very fine apple. I second the motion. (Carried.)

J. P. COCKBURN: I suggest that the Wealthy apples be changed from winter to fall in its classification. (Carried.)

SECOND DAY—AFTERNOON SESSION.

The PRESIDENT: We are very pleased to see that there are so many gathered in so early. We will now take Mr. Beadle's resolution.

Mr. BEADLE: The committee on resolutions desires to present this resolution to the meeting: "Resolved, that the thanks of the association be given to Prof. Panton for his very valuable and instructive lecture on the Fungi. We desire to express to him our great appreciation of the great kindness shown by him in coming to our meeting and entertaining us for an hour at so great inconvenience and with such entire self-forgetfulness." Carried.

Prof. Panton thanked the members for the very cordial manner in which they expressed their appreciation of his effort. He did not know when he had stood before a more appreciative audience.

SCORE CARDS FOR JUDGING FRUITS.

The PRESIDENT: I dare say most of you will have recognized the difficulty of securing united judgment of fruits at our fall fairs. The secretary will now deal with that question.

Secretary Woolverton then read the paper as follows:

Already the Ontario Fruit Growers' Association has taken steps to secure greater uniformity and fairness in the judging of fruits at agricultural and horticultural exhibitions throughout Ontario. The fruit catalogue published annually in our report, is referred to by intelligent judges for final appeal in disputes concerning the value of varieties, but, it is not, however, used as widely as it should be. Some judges make free use of it in judging their collections, while others pay no attention whatever to it and jump at hasty conclusions.

I think it most important that we should pursue this matter still further until we are able to furnish every secretary of every agricultural and horticultural society with a score card for the use of their judges.

True, it requires a great deal more time to judge fruit in this careful way, assigning to each variety its value on some systematic basis, than it does to merely jump at conclusions from the general appearance of the collections, but such careful work amply repays the time it occupies. As conducted at present, our fairs fail entirely in accomplishing the end for which they were intended. They do little or nothing in educating the public with regard to the real value of the varieties shown, or in directing planters concerning the most profitable or most useful kinds to plant for the various purposes. No doubt there are some judges who take into consideration more than merely the appearance of the collections, but, if they do base their decision on some sensible list of points, the public do not know what these are and consequently are no wiser in this

respect than they were before. Now, if a score card were used with clearly defined points showing every investigator the points taken into consideration in giving the decision, and showing the real value of each variety as made up of the various points of merit which it possesses, the public would take great interest in reading these over and would soon become educated regarding the important points which guide the judges in estimating the value of varieties, and planters also who are about to plant orchards would be able to do this much more intelligently after having made a study of the exhibits at the various fairs.

I do not propose to give you a form for a score card that would be beyond criticism. I simply place before you two or three forms with the object of stirring up that careful discussion on this subject which it so well deserves, and hope that either in the open meeting or by the aid of a committee, we will be able to prepare such a score card as will secure the approval of this whole association. These should then be printed in quantity and a sample of them sent out to the secretary of each agricultural and horticultural society in our province.

I think it is important that not only the judges should use these, but also that the public should be fully acquainted with them, in order that the exhibits may be made with greater intelligence than they are at present.

Here is a sample of the card proposed for judging single plates of apples and pears :

Apples and Pears.	Value of points.	Score.
Form	10	
Size	10	
Color	10	
Freedom from blemishes	20	
Uniformity	20	
Quality	30	
Perfection	100	

Then for judging collections of apples and pears, I presume quite a different form, perhaps this one for a large, general collection :

Variety.	* Value of samples.	Catalogue value of variety.	Total points.
(For example.)			
Baldwin	5	22	27
To sum of total points add maximum of 10 for covering season.			

* 10 points as follows : form 1, size 2, color 2, clearness 3, uniformity 2.

On this card the list of varieties may be entered, the value of the sample shown, and the absolute value of the variety as shown in our apple or pear catalogue as the case may be. The sum of these will be the number of points gained by the variety in the collection and the total value of these sums will be the total value of the collection.

Thus, the value of the sample of Baldwin shown may be only five, out of a total of ten possible points, the absolute value of the variety as shown in our report is twenty-two, and adding these together we have twenty-seven as the total value of this variety in the collection.

I have made ten the maximum in this case, rather than one hundred, for the sake of simplicity. On a large collection it will be best to just keep in mind the relative value of the points, and to work out the value of each sample mentally on that basis.

For a collection of varieties for dessert purposes a somewhat different card should be used. Thus :

Variety.	*Value of samples.	Catalogue value of variety.	Total points.
(For example.) Baldwin.....	5	2	7
To sum of total points add maximum of ten for covering season.			

* 10 points as follows : form 2, size 1, color 2, clearness 3, uniformity 2.

And for cooking, the following will be adapted :

Variety.	*Value of samples.	Catalogue value of variety.	Total points.
(For example.) Baldwin.....	5	5	10
To sum of total points add maximum of ten for covering season.			

* 10 points as follows : perfection of form 1, color 1, size 3, uniformity 2, freedom from blemishes 3.

In these two last forms instead of taking the total value as given in our catalogue, the value there given for dessert or cooking should be used respectively. Thus, the sample of Baldwin, which, on account of lack of color, lack of uniformity, and for blemishes, only has a value of five, gets two additional points only as a dessert apple ; while for a cooking apple the same sample Baldwin is worth five marks, making the value of this variety in the collection ten, for cooking.

For judging grapes of course quite a different set of points must be observed from those used in judging apples and pears. I would propose for single plates :

Grapes.	Value of points.	Score.
Flavor.....	30	
Form of bunch.....	10	
Size of bunch.....	15	
Size of berry.....	15	
Color.....	10	
Firmness.....	5	
Bloom.....	5	
Freedom from blemishes.....	10	
Perfection.....	100	

The following might be used for collections of grapes :

Variety.	*Value of sample.	Catalogue value of variety.	Total points.
Concord	8	21	29
Delaware	6	26	32
Lindley	5	28	33
Niagara	9	22	31
Pearl	8	4	12
For example. (.....)			
Add maximum of ten for covering season			137
			6
			143

* 10 points as follows : Flavor 3, form of bunch 1, size of bunch $\frac{1}{2}$, size of berry $1\frac{1}{2}$, color 1, firmness $\frac{1}{2}$, bloom $\frac{1}{2}$, freedom from bluish 1.

POTATOES AND TOMATOES.

The Massachusetts State Board of Agriculture has established a scale of points for judging vegetables. Pamphlet forms, containing cuts and scale of points for two or three of the finest varieties of all the different vegetables, are being issued for the use of the incorporated Agricultural Societies. This is one advance needed by all agricultural societies, as very often men are appointed to judge at shows who differ very widely in their ideal of a perfect specimen, and by having an authorized scale of points to guide them a much less unjust decision will often be given. As an example of their plan, we give scale of points given for "Beauty of Hebron" potatoes :

Size—Should be $4\frac{1}{2}$ inches long and $3\frac{1}{2}$ inches wide for perfection, 30 points.

Form—Should be according to engraving, as given in pamphlet, 30 points.

Smoothness—Free from deep pits, warts, or excrescences, 30 points.

Quality—Fresh appearances, freedom from coarseness, and bright color, 10 points.

Total 100 points.

The following is the scale of points for tomatoes :

Form—Should be according to engraving, 40 points.

Color—Should be bright red or purplish pink, according to variety, 30 points.

Size—Should be not less than $2\frac{1}{2}$ inches and not more than $3\frac{1}{2}$ inches in diameter, 15 points.

Quality—Firmness, ripeness, and freedom from green spots or cracks, 15 points.

As such a manner of judging fruits would entail a great deal more labor than the plan now adopted, I suggest that only one judge be appointed in each section, instead of three, as at present, and that this one judge be an expert and one who has the confidence of the exhibitors as well as of the authorities. Further, I recommend that this judge should be allowed the amount now paid to the three. In this way there would be sufficient compensation for the work done, and better work would therefore be secured. One judge would work almost as fast as three, and, if properly paid for his time, could afford to do his work well.

A committee was appointed by the meeting at Orillia to consider this subject and report. The committee recommended the adoption of the score cards, with the amendment that in awarding the points for every season, in collections the maximum be computed on a basis of five points for each variety shown in such collection, instead of allowing ten marks as a maximum in all cases.

Secretary WOOLVERTON : I move that a committee of three be appointed to consider the score cards as proposed—one who has been judging grapes, one who has been judging apples, and so on.

Mr. BEALL moved that the president, Murray Pettit, and A. H. Pettit be the Committee. Carried.

PROGRESS IN SPRAYING DURING 1894.

Mr. JOHN CRAIG, Horticulturist Central Experimental Farm, Ottawa, read the following paper :

No line of work associated with the successful culture of fruits at the present time is charged with greater interest to the horticulturist than is the subject of this paper. It is also true that no other advance in horticultural practice has been so readily taken up by the more progressive and practical and discussed by the theoretical and procrastinating class. Third and fourth classes may be made of those who have tried without success the remedies recommended, and those who disbelieve and have not tried. But honest doubt should always be respected.

Again, there are few if any operations now included in the annual programme of the fruit grower the success of which is so dependent on conditions practically outside the control of the operator than is spraying. Meteorological conditions, as rain and wind, heat and cold, bear a marked influence on the results, and often discourage a beginner from carrying into practice good resolutions formed at the opening of the season. An unfavorable season will so frequently mar the effect of conscientious effort as to place in doubt the beneficial results, thus shaking the confidence of the beginner.

Before taking up the subject of this paper, namely, the result of the season's work, it might prove interesting to preface it with a brief history of the introduction of the practice of spraying.

HISTORY OF THE PRACTICE OF SPRAYING.

In 1882 Professor Millardet, an eminent botanist of Bordeaux, France, had his attention called to the fact that grape vines sprinkled with a mixture of bluestone and lime to deter the inroads of boys and vagrants, were much less attacked by mildew than other vines not so treated. Acting on the suggestion conveyed by this object lesson, he carried on experiments during 1883 and 1884, and gave to the public the result of his work on May 1st, 1885. As Mr. Fairchild, of the Department of Agriculture, Washington, says in an excellent article recently published on Bordeaux mixture as a fungicide : "It appears that to Millardet is due the credit of first correctly interpreting the immunity shown by the treated vines in Medoc, and of conceiving a practical method by which copper sulphate could be used as a remedy for the disease in question."

The news of this discovery was soon chronicled in America, and bulletins of recommendations were issued by the Department of Agriculture at Washington and the California experiment station early in 1886. The following two years gave to the public the results of experiments conducted in the United States, and established a formula for Bordeaux mixture which has been more or less generally accepted and has become in a measure a standard. This formula was recommended by Mr. Galloway, chief of the division of vegetable pathology at Washington, D.C., and consisted of 6 pounds of copper sulphate and four pounds of lime in twenty-two gallons of water. The first formula however, was much stronger than this and contained eighteen pounds of copper sulphate and about 30 pounds of lime to which was added 30 gallons of water. Such a mixture resembled a thick paste and was applied by means of wisps of straw or brooms. Many other mixtures were soon introduced and tried by the active American scientists, principally on account of the difficulty of applying the concentrated form of Bordeaux mixture. In the spring of 1890, the first year of the appointment of the writer as horticulturist to the Central Experimental Farm, Ottawa, experiments were planned and carried out in

orchards at Abbotsford, Quebec. The experiments were designed to show the benefit of spraying with ammoniacal copper carbonate in varying proportions, copper sulphate of varying strength, and the value of hyposulphite of soda as a fungicide. The variety treated was Fameuse, and the results gained demonstrated the profit of spraying with ammoniacal copper carbonate of the strength since recommended by the horticultural division of the Experimental Farm. Experiments have been continued each year up to the present, but marked more or less according to season. In the initial stages of this work the important question of economy and ease of application in addition to the effectiveness had to be studied by the experimenters, so that a remedy, when discovered, might be practicable and thus commend itself generally to the public.

These experiments covered the trials of over thirty spraying mixtures, and among the fruit included were apple, pear, plum, cherry, peach, and the majority of the small fruits.

Owing to the difficulty of applying and the cost of making the concentrated Bordeaux mixture, many other copper salt compounds have been tried, with the result that many were discarded while a few were recommended for trial. Copper sulphate or bluestone having entered into all mixtures giving favorable results, the number of formulæ recommended have gradually lessened with each year's experience till at the present time, while we have yet much to learn, the fruit grower need not burden his mind with a bewildering array of recipes or formulæ, almost as numerous as the legion of enemies which attack his orchards and vineyards.

As a result of experiments conducted in 1892, the writer recommended a modified formula for the preparation of Bordeaux mixture. This was given to the public by means of bulletins and circulars during 1892 and 1893. The formula is as follows: Four pounds of copper sulphate, four pounds of lime and fifty gallons of water. The cost of this need not exceed one-half cent. per gallon, and admits of the addition and application of Paris green. At the same time coupled with this was ammoniacal copper carbonate, which will not be used as freely as Bordeaux mixture on account of its greater cost and the increased labor of preparing it. For spraying late in the season when stains on the fruit are undesirable, it is the most useful agent yet discovered. In copper sulphate we have the base or foundation of both the above mixtures, and a very effective fungicide to apply before the foliage appears. With this trio, backed up by intelligence and perseverance, the fruit grower may largely increase his orchard revenue.

EXPERIMENTAL WORK IN 1894.

I firmly believe that through the co-operation of the Fruit Growers' Association of Ontario, the value of this work has received such an emphatic confirmation that the resulting impetus will place the practice of spraying to lessen fungous injury, as well as insect attacks, on a plane well out of the reach of controversy. While the benefits arising from the practice have been satisfactorily proved by the writer, as well as by leading fruit growers, and the system strongly advocated, yet conflicting results obtained here and there continually threw a dark shadow, and gave rise to doubt and discussion. This, I am happy to say, culminated in a resolution moved by the retiring President, Mr. A. H. Pettit, at the last meeting of the society held at Peterboro'. This resolution read as follows: "That in the opinion of this meeting it is desirable that our Director of the experimental farms be requested to make during the coming season at several centres of fruit culture a public, practical test of the efficacy of the solution recommended for the prevention of the scab on apples." The Minister of Agriculture for the Dominion at once recognized the immense interests involved, and was pleased to authorize the experiments, the writer being commissioned to carry them out. Experiments were instituted at seven different centres in the Grimsby and St. Catharines districts. It is a pleasure to record the cordial spirit of co-operation manifested by the fruit growers of the Grimsby and St. Catharines districts and the helpful manner in which they facilitated the progress of the work. The inauguration of the experiments was unavoidably delayed till May 1st, which, on account of the abnormally early spring, was fully two weeks later than desirable. This, followed by the unprecedented and continuous rains during May

and June, coupled with the scorching heat and drouth of mid-summer and autumn, all combined to form a season with conditions most unfavorable to obtaining even average results. Regarding the character of the weather, Mr. Wm. Orr, of Stony Creek, Ont., writing under date of June 18th says: "We have been laboring under almost unsurmountable difficulties in trying to carry out our spraying programme. It has rained every day, with one exception, for 21 days, and plowed ground has been like a mortar bed. It has even been impossible to get upon well under-drained land part of the time." The same condition of affairs is chronicled by Messrs. M. Pettit, A. H. Pettit, C. P. Carpenter and E. J. Woolverton in the Grimsby district. Writing from St. Catharines under date of June 5th, Mr. M. Burrell says: "Owing to the disastrous weather we have been at a standstill. For more than two weeks it has been raining daily, and not only has all farm work been suspended, but spraying operations have been impossible on account of the softness of the ground."

Mr. A. H. Pettit says, on June 20th: "We shall again go to spraying as soon as we can float a waggon with the barrel in it."

Following on the heels of the downpour came a period of ideal weather for the development of fungous growth. Never, to my knowledge, has the apple scab (*Fusicladium*) appeared in such a virulent form. The fungus coming before the fruit had much more than formed, attacked the foliage so severely as to cause it to resemble and be easily mistaken for the ordinary twig blight. In many districts apple trees presented a scorched and browned appearance as if suffering from blight and severe drouth. Most varieties lost a large proportion of their leaves, which of course resulted in a corresponding loss of the fruit. This visitation, however, had the effect of emphasizing the value of spraying as a factor having an important bearing on increasing the yield in seasons of severe fungous visitation, as well as improving the quality of the fruit. I mention this now to elucidate the apparent discrepancy in the yields of treated and untreated trees. To sum up briefly, untreated trees lost their foliage and consequently their crop of fruit. Spraying prevented the growth of the fungus on the foliage which was thereby retained and with it a large proportion of the fruit. These are points worth remembering. Peaches, cherries and plums were treated with the two-fold object of preventing loss from a fungous disease causing the fruit to rot on the tree, and insect attacks; apples and pears to prevent injury from *Fusicladium* and insect pests. The results, owing to the difficulties outlined above, were not conclusive in every instance. This was reasonable in consideration that in one or two cases no spraying was done between May 4th and June 5th, owing to the continuous rainfall. Another cause affecting the completeness of the report was the failure of some of the experimenters in the hurry of marketing operations to record carefully the yields of the sprayed and unsprayed trees. Writing of this phase of the question one of the committee very sensibly remarks that "there seems to be a little difficulty in getting reliable statistics as to numbers, weights, etc. When the exact moment arrives for counting specimens and weighing fruit the experimenter will probably be so rushed with other work that the details of the experiment may be neglected and the value of the whole test seriously impaired."

However, I am pleased to state, and I think you will agree with me, that the records which have been secured are sufficiently convincing of themselves to be entirely satisfactory, although it is to be regretted that full returns could not be obtained in every case.

Peaches.

Experiments mainly designed to prevent rot and leaf-curl were carried on in the orchards of Messrs. J. H. Broderick and Eli Gregory & Son, of St. Catharines, Ont., with the help of the gentlemen and the kind co-operation of Mr. Burrell.

The trees should have been sprayed according to the programme outlined in the accompanying calendar, but owing to the earliness of the season the trees were too far advanced to risk the application of copper sulphate. Treatment accordingly began on May 1st with Bordeaux mixture: 4 pounds of copper sulphate, 4 pounds of lime to 50 gallons of water. The second application was made on May 15th. Three ounces of Paris green was added to each barrel of mixture. The trees were treated again on June 4th,

July 11th and July 5th. On account of some indications of injury to the foliage the formula was weakened for the last two applications to three pounds each of copper sulphate and lime and the same quantity of water. Up to July 5th rain was more or less constant. On July 31st Mr. Burrell reported that there seemed to be no difference between sprayed and unsprayed trees in the number of peaches affected by curculio. In regard to rot: "Early Rivers" showed 2 to 4 per cent. rotten on sprayed trees and 5 to 7 per cent. on unsprayed trees. At this time the fruit was beginning to color. The spot fungus (*Cladosporium*) was considerably worse on unsprayed trees. On August 7th "Early Rivers" showed about 6 per cent. of rotten fruit on sprayed trees and 8 per cent. on unsprayed trees. "Early Richmond" gave approximately the same results. As the crop was excessively heavy the amount of affected fruit even on unsprayed trees could not be regarded as harmful, owing to the beneficial effects accruing from this thinning process. In fact the quality of the crop would have been much improved by removing at least 30 per cent. of the fruit which set, a large proportion of which was allowed to mature.

With regard to the leaf-curl, there was none on the treated trees and scarcely a sign of it throughout the orchard. Mr. Burrell noted at harvesting time that in all cases the fruit on the sprayed trees was higher colored than that on the untreated trees. This was undoubtedly due to the absence of the spot fungus already referred to as *Cladosporium*.

Notes taken on September 1st indicate that as far as it was possible to judge by appearances, the sprayed trees carried more and better fruit, and had much better foliage than those untreated. On the matter of pears we have, however, interesting evidence from Mr. M. Pettit, of Winona. Although experiencing much inconvenience from continuous rainfall, he reported on May 26th, that on looking over the sprayed and unsprayed he could see quite a difference in favor of the sprayed trees. "The Beurri Gifford and Flemish Beauty, unsprayed, showed considerable fungus, both on leaf and fruit, while on the sprayed trees there is scarcely any to be found. I also think there is more fruit on the sprayed trees." Writing again under date of November 7th, Mr. Pettit says: "Regarding the yield of pears I am unable to give you exact figures, but I think the sprayed trees of Flemish Beauty had fully 75 per cent. more fruit than those not sprayed. Beurri Gifford, sprayed twice before blooming and regularly afterwards, were loaded with perfectly clean fruit, while trees of the same variety not sprayed until the fungus appeared, which was very soon after the pears had formed, on May 29th and June 9th, were almost entirely destroyed. There was not much difference in the Bartletts sprayed and unsprayed, as they were all a good clean sample this year."

The trees were sprayed with copper sulphate on April 16th, Bordeaux mixture on May 4th, 15th and 29th, and June 13th and 29th. Paris green was added in the later sprayings. The best proof of Mr. Pettit's belief in the work is his statement that he fully intends to spray thoroughly next year. He also concludes, as a result of the season's experiments on pears, that two sprayings before the blooming period are of more value and have more effect than four sprayings after that period.

In the orchard of Mr. E. J. Woolverton, a striking example of the effect of Bordeaux mixture upon Flemish Beauty pears was provided. Of two young trees of this variety standing alongside each other in the same row one was sprayed, the other not treated. On August 29th the sprayed tree was clothed with luxuriant foliage and carried an average crop of clean fruit, while its neighbor, the unsprayed, had lost fully 25 per cent. of its leaves and was almost bare of fruit. The result at harvest time was a bushel of good pears on the one hand and a few inferior specimens on the other.

Let us conclude then that the cracking and spotting of the pear may be prevented with great benefit to the tree by the timely application of Bordeaux mixture, and that in treating these diseases the early treatments are most important.

Apples.

It is gratifying to be able to record results which cannot be accepted otherwise than as absolutely conclusive in connection with perhaps the most important class of fruit which entered into this experiment, viz., apples. The usual difficulties and hindrances

encountered make the results all the more emphatic and valuable. I wish also to state that the work should have been commenced at least ten days earlier than when it was begun, and that the first spraying should have been made with copper sulphate. This is in line with the experience of Mr. Murray Pettit.

An interesting experiment was planned and inaugurated in the extensive apple orchard of Mr. C. P. Carpenter, but was not carried out owing to the condition of the ground, it being so soft as to preclude the possibility of getting horses into the orchard. Thirty-two days elapsed between the first and second sprayings, but the benefit of the first application could easily be seen in August on the foliage of Greening, Colvert, Spy and Early Harvest. Mr. Carpenter also noticed an improvement in the quality of Northern Spy.

The results of the experiments made by Messrs. M. Pettit, E. J. Woolverton and A. H. Pettit are given in the accompanying tabulated statement.

In submitting his results Mr. M. Pettit says that the Snow apples were not quite free of fungus, but much better than last season. Spys were much improved, while the tests on Baldwins was a great success.

Mr. E. J. Woolverton, writing under date of October 25th, says: "I have no doubt that had the experimental plots received an application of copper sulphate earlier in the season the results would have been still more satisfactory; but even now, after all the fruit is picked, it is an easy matter to pick out the treated trees from the untreated, owing to the much richer and more healthy character of their foliage."

Mr. A. H. Pettit, at one time indifferent in regard the value of spraying, and to whom I specially owe my best thanks, not only for inciting the movement, but for most faithfully and conscientiously carrying out under extreme difficulty the entire plan of the experiment as originally laid down, writes as follows:

"I now enclose you a statement of the result of the spraying experiment with *Bordeaux* conducted in my orchard under your direction during the past season; and in doing so I must express my great satisfaction in the results obtained; it has shown the effects in such a marked degree.

"The experiment you conducted here this season has demonstrated to me, and many other fruit growers, that spraying with *Bordeaux*, properly applied and at regular intervals, will be of great practical value in destroying the fungus that is, I believe, causing the unfruitfulness of our orchards. The sprayed trees, aside from the large increase of crop, presented a fine healthy foliage, while those by the side of them, *unsprayed*, showed a very unhealthy appearance and no fruit. I might add, that while the fruit on the sprayed trees was of good size and color it was not entirely free from damage by the codling moth, and on two or three varieties, the American Golden Russet, Fameuse and Swaar were affected by a scab to quite an extent. Now, this may have taken root during our excessive wet weather a few days after the first spraying. I am also inclined to think, although I have no means of knowing it to be so, that the *Bordeaux* mixture does to some extent destroy the action of the Paris green. Had it not been for the work of the codling moth the percentage of first quality would have been greater.

"Now, I may go a little beyond the experiment proper, having sprayed a number of trees to a greater or less extent. The season, as you are aware, was most unfavorable in some respects, not only for spraying regularly, but for the cultivation of the orchard and vineyard. The extreme wet being followed by the rapid drying up of the land, I was pressed for time to get what spraying I did get done (beyond the experiment proper) with any regularity. Some were done moderately well, while other parts were not done so well, but I can distinctly trace the good effects of the application in the increased production, and also in the improved condition of the foliage, even to the extent of one side—quite a number of the trees producing good results and good foliage on one side, while the other side of the tree was barren of fruit and of unhealthy foliage.

"I believe, sir, that the value of this experiment, so practically demonstrated, will give a wonderful inspiration to our fruit growers to fight straight along this line, and I trust your report will be convincing and as widely distributed as possible, in order that every fruit grower may reap the reward of your and your associates' researches and experiments to destroy the insects and diseases that are affecting our fruit trees and fruits, and

I trust if there are any other doubting fruit-growers as to the benefit of spraying you will convert them at once, even should it be the means of flooding the universe with clean, choice, Canadian fruit."

The crop of peaches in Mr. Gregory's orchard was also uniformly large, and of good quality throughout. So little apparent difference could be noticed that picking records were not preserved. My own notes taken on June 26th and August 29th, indicate that there was less rot on the sprayed trees among the early varieties such as Rivers, Mountain, Rose and Crawford.

To sum up: Experiments on peaches were not attended by marked results owing to the absence in a large measure of fungous diseases, and the presence of an unusually heavy crop of fruit. From the experience of the past season, it appears desirable to apply even a weaker formula of Bordeaux than that recommended, and it is suggested that after the foliage has appeared three pounds each of copper sulphate and lime to fifty gallons of water be used. This formula might be used in treating all stone fruits, although cherries were not injured by the ordinary formula.

Plums.

I am glad to be able to report more definite results regarding the treatment of plums. In Mr. Broderick's orchard a block of plums composed of Munro, Bradshaw and Lombard was selected, and a part of each sprayed on the dates already given. The trees were young, just coming into bearing. Rot was more or less prevalent on all varieties, but the greatest damage to the trees was wrought by the shot-hole fungus (*septoria cerasina*), and in preventing this disease the best results were obtained. Fruit growers well know the effect on the fruit of the loss of the foliage previous to the harvesting period—decreased size and poor coloring are sure to follow.

Notes taken on June 26th and August 29th, emphasize the fact that the foliage of the sprayed trees was vastly superior to the unsprayed. In walking through the orchard the difference in the health and luxuriance of the two series at once made itself apparent.

To obtain accurate data regarding the character of the fruit, two trees were selected as much alike as possible in every respect, one sprayed, the other unsprayed. The fruit of each was gathered and weighed. The sprayed trees yielded fourteen and a quarter pounds of sound plums, the unsprayed twelve pounds. But the difference was most noticeable in the superior size and quality of the fruit from the sprayed tree. One hundred plums from this tree weighed three pounds and nine ounces, while one hundred plums unsprayed, weighed two pounds and one ounce.

The sprayed plums would easily sell as good first, while the unsprayed, owing to small size and lack of color, could hardly be classed as seconds.

Touching the treatment of plums, Mr. Wm. Orr, of Stony Creek, Ont., writes as follows: "Other years we have lost heavily from rot, especially on Duane's Purple and Pond's Seedling, frequently losing the greater part of the crop of these varieties. This year the trees were heavily loaded with fine clean fruit which was marketed without any serious loss from rot. The check trees of Pond's Seedling dropped their fruit early in the season, and the checks of Duane's Purple rotted considerably, although not so badly as they did some other years."

In this connection Mr. Orr states that he found spraying with Paris green effectual in destroying the curculio.

Mr. Burrell, of St. Catharines, also writes that he had two rows of bearing plum trees, the end tree of each row being left unsprayed. "On October 22nd, when these two untreated trees were practically bare the rest were looking green and thick with leaves." I may say in this connection that the Experimental Farm plum orchard, made up of some seventy-five varieties, including many varieties of *Prunus Americana*, has been kept entirely free from rot by the persistent application of Bordeaux mixture each year in conjunction with Paris green to prevent curculio attacks. Native plums in the vicinity of Ottawa have for the past three years been a failure owing to rot (*monilia*) and the spot disease (*cladosporium*.) In my opinion, no plum grower can afford to omit spraying with Bordeaux mixture and Paris green.

Cherries.

Experiments for the prevention of rot were carried out in the orchards of Messrs. Broderick and Gregory, of St. Catharines, Ont., and E. J. Woolverton, of Grimsby, Ont.

Spraying began with Bordeaux mixture on May 1st, when the blossoms were beginning to open. Three additional applications were made with the same mixture with the addition of Paris green. Records of yields were obtainable from Messrs. Broderick and Woolverton. The former gives the yields of two trees of Yellow Spanish as nearly alike in every respect as possible at the beginning of the season.

Sprayed trees yielded ninety pounds of sound fruit.

Unsprayed trees yielded thirty pounds of sound fruit.

Mr. Broderick adds that the lower branches of the treated tree were well loaded with sound fruit, while there were a good many cherries at the top of the tree which was not thoroughly covered in spraying. This emphasizes the necessity of great care in applying the fungicide.

Mr. Woolverton's results were rather startling in their emphatic conclusiveness. He reports as follows: "Gave cherries three applications of Bordeaux mixture with four ounces of Paris green to fifty gallons of water on the following dates, blossoms having fallen May 10th, May 26th, and June 4th, also one application of ammoniacal copper carbonate on July 4th." Note—June 4th.: "Cherries already show good results; the tree left unsprayed is much inferior in fruit and foliage to the one treated."

July 9th.: "Picked fruit on unsprayed tree, yield seventeen pounds." July 10th.: "Picked part of fruit on sprayed tree, amounting to 112 pounds; the remainder not quite ripe." July 17th.: "Picked remainder of fruit of sprayed tree, eighteen pounds; total yield, 130 pounds."

"Spraying cherry trees with Bordeaux mixture not only prevents rot, but seems to prolong the growing season, as will be seen from the above dates of picking." He further says that the advantage from spraying these trees is apparent from the following figures which are absolutely correct: Cherries from sprayed trees netted \$9 25, and were a choice sample. Cherries from unsprayed trees netted \$1.20, and were a medium sample.

These are actual results obtained from two large trees, the advantage being on the side of the unsprayed in point of size of tree and bearing capacity at the time spraying began. One of the lessons this teaches is that in the case of cherries early spraying—that is, before the buds start—is not so important as the thorough and frequent application of the fungicide during the growing period of the fruit.

Pears.

The spotting and cracking of early pears, notably the Flemish Beauty, has for the past few years been a source of great loss to fruit growers. Strong evidence on this subject was submitted by Mr. Orr at the last meeting of the Society at Peterboro'. He also reported failure in preventing the disease by spraying with Bordeaux mixture. The orchard referred to was one of those selected for experiment this year, but unfortunately, owing to the following reasons given by Mr. Orr, no definite results were obtained. He says: "Owing to an extremely wet June, it was impossible to carry out the experiments thoroughly, or as we should liked to have done. The severe drouth in mid-summer seriously impaired the quality and size of the fruit. The soil being heavy clay felt the effects of the dry weather most keenly. A heavy wind storm occurred before harvesting time and blew off the more or less prematurely ripened fruit, which at this time was unfit for market. It was therefore impossible to estimate the value of the work done on pears."

RESULTS OF EXPERIMENTS.

The orchards from which the most complete returns have been received are those of E. J. Woolverton and A. H. Pettit, of Grimsby, Ont. Table I. shows the varieties treated and the percentage of yield of fruit of the different grades after being carefully sorted. Mr. Woolverton's table also shows the relative percentage of windfalls in both series. Having these figures the deductions which appear in Tables II. and III.

are drawn therefrom in order to present the results in a clearer and more convincing manner. In these tables are presented the combined and averaged results of all experiments, and the percentage of gain in yield of fruit of the sprayed over the unsprayed trees. This table shows that the sprayed trees yielded 24 per cent. more of first class fruit and 6 per cent. and 18 per cent. less, respectively, of second and third class.

TABLE I. showing variety treated and percentage of yield of fruit of the different grades.

Variety of apple.	How treated.	Firsts.	Seconds.	Thirds.	Per cent. of total yield.	
		Per cent.	Per cent.	Per cent.		
E. J. WOOLVERTON :						
Golden Russet	Sprayed	Handpicked	36.07	34.86	29.05	} 80.13
		Windfall		49.09			50.90
"	Unsprayed	Handpicked	7.89	52.63	39.48	} 19.86
		Windfall		15.00	85.00	
Baldwin	Sprayed	Handpicked	80.43	19.56	29.16	} 100.00
		Windfall		70.83		
"	Unsprayed	Handpicked				}
		Windfall				
Greening	Sprayed	Handpicked	55.61	29.75	14.63	} 93.90
		Windfall		34.70	65.30	
"	Unsprayed	Handpicked		100.00		} 6.09
		Windfall				
Northern Spy	Sprayed	Handpicked	52.25	41.08	6.66	} 65.90
		Windfall		71.42	27.58	
"	Unsprayed	Handpicked	11.83	42.40	45.76	} 34.09
		Windfall			100.00	
Cranberry Pippin	Sprayed	Handpicked	17.04	56.12	26.84	} 67.94
		Windfall		36.66	63.34	
"	Unsprayed	Handpicked	2.48	58.70	38.82	} 32.05
		Windfall		36.00	64.00	
Spitzenberg	Sprayed	Handpicked	51.15	41.86	6.99	} 100.00
		Windfall		52.63	47.37	
"	Unsprayed	Handpicked	none.	none.	none.	
A. H. PETTIT :						
Blenheim Pippin	Sprayed		80.00	20.00		51.72
"	Unsprayed		25.00	53.57	21.42	48.28
Baldwin	Sprayed		75.32	14.34	10.33	100.00
"	Unsprayed					
Greening	Sprayed		69.96	20.72	9.32	97.05
"	Unsprayed		13.33	36.00	50.67	2.95
Red Astrachan	Sprayed		54.29	28.96	16.75	75.71
"	Unsprayed		30.11	29.89	40.00	24.29
American Golden Russet	Sprayed		40.00	40.00	20.00	73.17
"	Unsprayed		27.27	54.54	18.18	26.83
Swaar	Sprayed		28.40	56.80	14.79	98.83
"	Unsprayed			100.00		1.17
Alexander	Sprayed		77.14	17.14	5.71	69.30
"	Unsprayed		58.06	29.03	12.90	30.70
MURRAY PETTIT :						
Baldwin	Sprayed		69.70	30.30		
"	Unsprayed		27.18	72.82		

TABLE II. shows the average percentage of the different grades from all varieties.

	Firsts.		Seconds.		Thirds.	
	Sprayed.	Unsprayed.	Sprayed.	Unsprayed.	Sprayed.	Unsprayed.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
E. J. Woolverton	31.77	5.40	44.53	49.70	23.69	44.90
A. H. Pettit	59.07	36.98	27.36	35.07	13.57	27.94
Average	45.42	21.19	35.95	42.39	18.63	36.42

TABLE III. shows the ratios of the yield of the three grades of fruit.

	Firsts.	Seconds.	Thirds.	Total yield.
	Per cent.	Per cent.	Per cent.	Per cent.
E. J. Woolverton :				
Sprayed	94.40	65.90	60.22	74.14
Unsprayed	5.60	34.10	39.78	25.85
A. H. Pettit :				
Sprayed	86.05	75.54	65.08	79.43
Unsprayed	13.95	24.46	34.95	20.57

The effect of this improvement *in quality alone* upon the gross receipts from an acre of bearing apple trees may be shown as follows : Supposing the yield to be 50 barrels we find, according to results gained, that spraying would give at ordinary market rates, \$2.50, \$1.75, and 0.75, for first, second, and third class respectively, \$56.75 worth of No. I. fruit, \$31.50 worth of "seconds," and \$6.97 of "thirds," or a total of \$95.22. The same area unsprayed would give of No. I. fruit \$26.75, of No. II. \$37, and of third class \$13.64, or a total return of \$77.40, leaving a balance in favor of the sprayed acre of \$17.82. This is supposing that all the "seconds" and "thirds," which in the case of the unsprayed is very large, could be sold. The cost of spraying an acre of apple trees will vary according to the size of the trees ; using diluted Bordeaux mixture and making five applications it need not exceed \$6 and may be under \$5. There would thus be a net profit of \$10 to \$12 on the basis of equal yields and improved quality. As a result of the experiments referred to, and looking at spraying as *affecting the yield*, we find that the sprayed trees gave 74 per cent. of the total yield. This return, added to the improved quality, gives a difference in the net receipts of \$51.53 in favor of the sprayed acre.

I do not think this side of the argument need be pushed farther, though it would probably prove interesting to know the effect of this on the crop of the province. Each grower will find it to his interest, however, to make a calculation for his own satisfaction on this basis.

EQUIPMENTS FOR SPRAYING.

Where the area to be sprayed exceeds 15 acres it will probably pay to buy a horse power pump. These are now made by several firms dealing in force pumps. One which I have used with satisfaction at Ottawa, during the past season, was purchased from the Field Force Pump Company, of Lockport, N. Y.

Where a barrel is used—and I may say that one of these will answer the requirements of all having 15 acres or less to spray—a strong force pump should be secured. The valves and inside working parts should be of brass, the metal chambers and all castings strong and heavy, and the packing of the most durable character. Nothing is more annoying, and nothing acts more as deterrent to the introduction of the practice of spraying, than the "breakdowns" which occur with irritating frequency at the beginning of the work each year. This matter has been represented so strongly to Canadian firms that I believe satisfactory pumps will be forthcoming next season. I have used with good results pumps manufactured by the Toronto Pump Company, and the Goold, Shapley, Muir Company, of Brantford, Ont., although the first "Ideal" pumps manufactured by the latter firm showed defects under strong pressure ; these I believe, have been remedied. Each pump should be supplied with two lines of hose, the lengths proportionate to the height of the trees, each fitted with a stop-cock. In cases of clogging the stop-cock will always be appreciated. The nozzles which gave greatest satisfaction were the "Vermorel" and the "McGowen ;" the latter is most economical of fluid and should be used exclusively when the trees are small, or upon the lower branches. The McGowen is a valuable instrument for carrying the liquid to the upper branches with

a minimum degree of waste. A bamboo pole through which a brass tube may be inserted, is an improvement over an ordinary pole for the purpose of elevating the nozzle. I wish to impress upon fruit growers the desirability of beginning the season's work with apparatus fully equipped and in good working order, as the ease with which the applications are made influences to a large extent the thoroughness of the work, and upon the thoroughness will depend in a large measure the success attending the undertaking.

PREPARATION OF BORDEAUX MIXTURE.

The ingredients are copper sulphate, lime and water. A good quality of copper sulphate should be secured. As pointed out by Mr. Fairchild, a brand which contains a large amount of iron or zinc sulphate should not be used, although it has not been proved that these ingredients actually injure the mixture. He further states that lime which is made from stone containing a large amount of clay is likely to be what is known as "dead" lime, and to contain small insoluble granules. This kind of lime may be used, but is likely to give trouble unless the resulting milk be well strained before adding it to the copper sulphate. Lime which is air-slaked should not be employed in any case since its use results in injury to the foliage. The method of preparing the mixture has so often been described that I need not again repeat the directions.

Where large orchard areas are under treatment the work of preparing Bordeaux mixture may be greatly lessened by making at the beginning of the season stock solutions of copper sulphate and lime, which may be diluted as needed. Dissolve 100 pounds of copper sulphate in 50 gallons of water; when dissolved 2 gallons will contain 4 pounds of the salt. In another barrel slake 100 pounds of lime and make up to a milk by adding 50 gallons of water. Two gallons when well stirred should contain 4 pounds of lime. When it is desired to make a barrel of Bordeaux mixture, take 2 gallons of stock solution of copper sulphate and add the same quantity of the milk of lime, which should neutralize it completely if the lime is of good quality. If the lime is air slaked or impure the right quantity can be ascertained by applying the ferrocyanide of potassium test. If the lime is deficient a drop of the ferrocyanide of potassium (yellow prussiate of potash) added to the mixture will turn brown; add lime water till the drop of ferrocyanide of potassium remains colorless.

AVERAGED RESULTS

GAINED IN SPRAYING FOUR LEADING VARIETIES.

Variety.	How Treated.	PERCENTAGE SCALE.									
		GRADES OF FRUIT.									
		10	20	30	40	50	60	70	80	90	100
A. G. Russet ..	Sprayed	First Quality.				Second Quality.				Third Quality.	
A. G. Russet ..	Unsprayed ..	1st. Quality.			Second Quality.				Third Quality.		
Baldwin	Sprayed	First Quality.							2nd Qual.	3rd Qual.	
Baldwin	Unsprayed ..	First Quality.				Second Quality.					
Greening	Sprayed	Second Quality.						Second Quality.		3rd Qual.	
Greening ...	Unsprayed ..	1st Qual.	Second Quality.				Third Quality.				
N. Spy	Sprayed	First Quality.				Second Quality.				3rd Qual.	
N. Spy	Unsprayed ..	1st Quality.		Second Quality.			Third Quality.				
Average of above.	Sprayed	First Quality.				Second Quality.				3rd Qual.	
	Unsprayed ..	1st Quality.		Second Quality.			Third Quality.				

AVERAGE RESULTS FROM ALL VARIETIES.

Percentage Scale	10	20	30	40	50	60	70	80	90	100
Sprayed	First Quality.				Second Quality.				3rd Quality.	
Unsprayed	First Quality.			Second Quality.			Third Quality.			

SPRAYING CALENDAR.

Plant.	1st Application.	2nd Application.	3rd Application.	4th Application.	5th Application.	6th Application.
<i>Apple</i> Apple spot fungus, codling moth, bud moth.	<i>Copper Sulphate</i> . Before buds start.	<i>Bordeaux</i> . Just before blossoms open.	<i>Bordeaux</i> . <i>Paris Green</i> .—Soon after blossoms fall.	<i>Bordeaux</i> . <i>Paris Green</i> .—10-15 days later.	<i>Bordeaux</i> . 10-15 days later if spot disease is severe.	
<i>Cherry</i> . Rot, leaf diseases and injurious insects.	<i>Bordeaux</i> . Before flower buds open. <i>Kerosene Emulsion</i> for aphids.	<i>Bordeaux</i> . <i>Paris Green</i> .—When fruit has set.	<i>Bordeaux</i> . <i>Ammoniacal Copper Carbonate</i> . 10-15 days later.			
<i>Grape</i> . Mildew, rot, leaf eating insects.	<i>Copper Sulphate</i> . Before buds burst.	<i>Bordeaux</i> . <i>Paris Green</i> .—When first leaves are half grown.	<i>Bordeaux</i> . When fruit has set.	<i>Bordeaux</i> . 10-15 days later.	<i>Bordeaux</i> . 10-15 days later. If disease persists.	<i>Ammoniacal Copper Carbonate</i> . If disease persists.
<i>Peach—Apricot</i> . Rot, leaf curl, curculio.	<i>Copper Sulphate</i> . Before buds start.	<i>Bordeaux</i> . 3 lbs. copper sulphate. 3 lbs. lime. 50 gals. water. Just before blossoms open.	<i>Bordeaux</i> . <i>Paris Green</i> .—Soon after fruit has set.	<i>Bordeaux</i> . <i>Paris Green</i> .—8-12 days later.	<i>Bordeaux</i> . <i>Paris Green</i> .—8-12 days later if rot is prevalent.	<i>Copper Carbonate</i> . 10-15 days later if rot is prevalent.
<i>Pear</i> . Scab, leaf blight, codling moth.	<i>Copper Sulphate</i> . Before buds open.	<i>Bordeaux</i> . Just before blossoms open.	<i>Bordeaux</i> . <i>Paris Green</i> .—Soon after blossoms fall.	<i>Bordeaux</i> . <i>Paris Green</i> .—10-12 days later.	<i>Bordeaux</i> . 10-15 days later.	
<i>Plum</i> . Rot, shot hole fungus, curculio.	<i>Copper Sulphate</i> . Before buds open.	<i>Bordeaux</i> . <i>Paris Green</i> .—Soon after blossoms have fallen.	<i>Bordeaux</i> . 10-15 days later.	<i>Bordeaux</i> . <i>Copper Carbonate</i> . 10-15 days later if rot is prevalent.	<i>Copper Carbonate</i> . 10-15 days later if rot is prevalent.	<i>Copper Carbonate</i> . 10-20 days later if rot is prevalent.

Prof. CRAIG exhibited photographs of trees before and after spraying.

Mr. McNEILL (Windsor): I had some difficulty in spraying. One of the difficulties was the straining. I used all sorts of material and spoiled any number of old suits of clothes preparing that stuff, and I would like you to recommend something to strain it through. Sacking and gunning cloth are no use whatever.

Prof. CRAIG: I do not think it is necessary to strain in every case. If you mix up the stock solution and then add your 50 gallons of water to the lime, you can get sufficient milk of lime from the top to neutralize the copper sulphate without any danger of clogging the nozzle.

Mr. McNEILL. In testing with the ferrocyanide you will find it very difficult to determine when there is a brown discoloration and when there is not. I suggest that you use a chemist's test tube, or a small bottle, and drop it in as you would in a chemical experiment and watch it between you and the light. I had unskilled labor with me, and I know the difficulties that arise on these little points.

D. W. BEADLE: Can't we get along without this little puttering business with the ferrocyanide? Farmers don't like to be bothered with little details like that. Can't we put enough lime in to make sure that we have done the work without any of this bother with the ferrocyanide?

Prof. CRAIG: I suppose in nine cases out of ten you can, but I think it is less bother with the ferrocyanide than without it.

D. W. BEADLE: Perhaps it is to you, but I know how the farmers grumble about doing all these little puttering things.

Prof. CRAIG: The whole operation of spraying is a puttering thing; I admit that. (Laughter.)

D. W. BEADLE: I think it would be possible to give them enough lime in a formula to make sure that you have destroyed all the injurious effect to the foliage from the bluestone.

Prof. CRAIG: If they use four pounds of copper sulphate and four of lime, there is plenty of lime and more than sufficient; but the idea of using this test is to use just enough so that there will be no danger of clogging the nozzle by having an excess of lime.

Mr. MORRIS (Fonthill): Don't you consider the impoverished state of the soil in which we generally find orchards, and the neglected condition of the trees helps to bring on and spread this fungus? I have noticed this past season particularly a light soil where the fungus ran over an orchard and scarcely left any fruit and the leaves fell off at the same time. On one orchard in strong heavy soil, about two miles from where I lived, where it was loaded with fruit, most of the leading varieties, the leaves were healthy and the fruit was clean and good, and the trees were just fairly bending down; and yet within two miles—in fact almost on the next farm—where the farms had been neglected, the leaves would be off.

Prof. CRAIG: There is no doubt that, upon general principles, the statement Mr. Morris has made will hold good, that, as pointed out by Prof. Panton last night, any plant or any animal if it is in a debilitated condition may be more readily attacked by disease than one that is healthy. At the same time we have many conflicting results. One of the orchards in which these experiments were carried on was a model orchard—you would not be able to find a handful of weed in the whole thing, it was well cultivated and well manured, and still the trees were badly affected by scab every year. They are making satisfactory growth and doing well every way except that they are subject to this disease. I do not think we can expect to correct all the evils by good cultivation, though of course as an aid it is very important.

Mr. MORTON (Wingham): The difficulty I find in making a solution is to dissolve the copper sulphate. You have got to start a considerable time ahead else you will lose a lot of time.

A DELEGATE : Take hot water.

Mr. MORTON : I used hot water. I was four hours dissolving twenty pounds, and I did enough grinding to grind up four or five bushels of wheat. The way I found to success was to take it in plenty of time, and all I had to do was to enclose it in a piece of cheese-cloth and suspend it in the top of the barrel, and allow it to remain there. It dissolved there in time and I had no bother. With regard to the lime I have settled down to a formula of four pounds of copper sulphate and six of lime. I mix with the lime and pass as much as will go through ordinary cheese-cloth. It leaves considerable lime behind. Lime is not very expensive, and I don't think any evil results from the excess of lime. When you consider that the excess of lime is simply fused through the large quantity of water there is no injury will result from that. I throw away the residue of lime, and fill up with equal quantities of water and mix them as I use them. I generally spray thirty gallons of water to four pounds of copper sulphate and six of lime ; but when I find others have no evil results with fifty gallons of water I find it is a waste of energy and money. I have dabbled in chemistry somewhat, and have tried the ferrocyanide test, and I consider it too much bother.

Mr. W. S. TURNER (Cornwall) : Is the fungi of the apple entirely dormant during the winter ?

Prof. CRAIG : It requires a certain amount of heat, and the requisite amount of moisture ; but I do not think there is any action at all on trees outside, though you have all noticed that the scab itself will grow in the temperature of your cellars on your apples. You can take a barrel of Fameuse in the autumn that have very small spots, and when you open them up at Christmas you find that fungus has grown and gathered a very much larger area than at first. That is a matter of temperature.

Mr. TURNER : There would be no object in spraying now with a strong solution of sulphate of copper ?

Prof. CRAIG : No harm would accrue from it, and probably some good, but we have data to show that it would pay for the cost of the work.

Mr. CASTON (Craighurst) : Have you verified that statement about the fungi spreading on the apples in the barrels ?

Prof. CRAIG : Yes ; I don't mean spreading from one apple to another, but it is a very common laboratory experiment.

A DELEGATE : Was there any more than the one spraying on those two trees of Northern Spys, shown in the photographs ?

Prof. CRAIG : Yes, those were sprayed five times.

DELEGATE : I had an observation of two trees that seemed to be equally blossomed until the fruit was set, and I took two and a half bushels off one tree and one-half off the other. There was no spraying.

Prof. CRAIG : One of them may have been attacked worse by the scab than the other.

DELEGATE : There was very little scab on any of them.

Prof. CRAIG : The fact of the leaves dropping showed the fungus was there. That is why they dropped.

DELEGATE : There was none on the apples that came to maturity.

Mr. LEHMANN : Is it allowable to use lime for Bordeaux mixture that has been slacked for some time.

Prof. CRAIG : Air-slacked lime should not be used.

Mr. LEHMANN : If it is slacked with water and run into a bed ?

Prof. CRAIG : I don't know how long it would keep in that condition. As long as it is covered with water and the air is kept away there would be no change take place. That is one of the points connected with making the stock solution. You can keep your lime in the bottom of the barrel all summer covered with water, and use it as you require.

Mr. CASTON : It is supposed to be stronger.

Prof. CRAIG : The grey clay lime is more satisfactory. It does not slack so well ; it does not make such a good base as the white lime ; it goes into granules.

Dr. BEADLE : The Bordeaux mixture will deteriorate if kept any length of time, and it is desirable to use it as fresh as possible. After a few days it loses a good deal of its value.

Prof. CRAIG : Yes, that is the very reason the stock solutions are made. If they are mixed together chemical action takes place which will destroy the fungicidal effects, and so they must be kept separate.

Mr. SPILLET (Nantye) : I have found no difficulty in dissolving bluestone if the water is kept perfectly hot. Get a cauldron or sugar kettle and empty the quantity in that, and put enough fire under it to keep it perfectly hot, and in a few moments it will perfectly dissolve. As to lime, in a country with field stone there is a great deal of sand, and to overcome this condition I mix a quantity of it in a barrel, and stir it up and allow it to settle for a moment and then pour the milk off ; throw in some more water and in that way I am of opinion from experiment that you can paint or whitewash foliage with lime, and it would not at all be injurious to a plant. I have actually whitewashed foliage with milk of lime to see whether it would have any deleterious effect, and there was no bad effect visible.

Mr. CRANSTON : Would Bordeaux mixture spread on trees hurt calves or hogs running in orchards afterwards ?

Prof. CRAIG : I do not think there is a possibility of poisoning stock from the effects of the spray falling on the fruit. The copper is not an active poison. It has a certain effect on the intestines—a sort of astringent effect—but is not an active poison such as Paris green or any arsenical compound. The actual experiment has been tried of spraying trees heavily with Paris green, and feeding hay which was grown under the tree to a certain animal without any injurious results whatever. I do not think on the average there is any danger need to be feared from that cause.

Mr. MORTON : I think it would not be proper to attempt to dissolve copper sulphate in an iron vessel. It would decompose a portion of the copper sulphate, and also mix up sulphate of iron with it and get an impure mixture.

The SECRETARY : I have done it and used up a good many iron kettles. It goes through them very quickly, but it certainly is a very quick way to dissolve it if you boil copper sulphate in a cauldron.

Mr. SPILLET : You can get large kettles lined with cement.

The SECRETARY : I think the quickest way is to have a stock solution of the lime—a barrel of lime water—then you can dip out into the sulphate solution until you get the ferrocyanide test, and very soon know whether you have dipped in enough. I think it is the quickest way to use the ferrocyanide, because you don't have to measure lime.

Prof. CRAIG : There is just one point more. Mr. A. H. Pettit expressed doubt as to the efficacy of Paris green when applied with the Bordeaux mixture. He thought its poisonous effects would be weakened. I carried on some experiments this year to test that. A row of crab-trees, fruiting heavily, were selected. One tree was sprayed heavily with Bordeaux mixture and Paris green in it ; the other was sprayed with Bordeaux mixture alone. The fruit was picked and the number of wormy apples counted at the close of the season, and out of twenty trees tried and experimented upon, the averages made up between the lot showed that there was only two-tenths of one per cent. difference in the results from one series to the other. So that we can say there was actually no difference, and the Paris green is just as effective when applied with Bordeaux mixture as when used alone.

Mr. FISHER : Have you found that Paris green assisted the Bordeaux mixture ?

Prof. CRAIG : I gave it a trial for two years, but I have had no good results from using Paris green as a fungicide, and I cannot say that it assists the Bordeaux mixture. It may be an aid.

The PRESIDENT : I think this subject has been pretty well discussed—thoroughly exhausted I might say—and as the time is passing rapidly we had better take up other addresses.

ROADS AND ROAD-MAKING.

The President introduced Mr. ANDREW PATTULLO, President of the "Ontario Good Roads Association"

Mr. ANDREW PATTULLO, after expressing pleasure at being able to attend this meeting of fruit growers, whose proceedings he had watched with great interest, said:—I know how deeply and closely related to the prosperity of the country the work of this association is. If it is true that he is a benefactor who will make two blades of grass grow where one formerly grew, the fruit growers of this country must be benefactors indeed, because you are successfully endeavoring to increase to an enormous extent the productive resources of this country. Outside of your association, the people of Ontario especially, and the people of all Canada are beginning to realize what you have realized for some time past, what great possibilities there are in this country for fruit growing, and how much the annual productive wealth of the country can be increased by intelligent and united effort in the direction of improvement. Some may be disposed to ask what relation good roads have to fruit growing? Well, it does not become me to dwell upon that. I think your president answered that question himself when he asked me to come here and say a few words upon a subject to which I have given some attention of recent years; but I think it is obvious to you all that good roads have a very direct reference and relation to fruit growing as well as to every other agricultural production of this country. You know that to fruit growers it is important not only to have good markets, but good facilities for reaching those markets. For instance, over a good road ten miles is not very far to any market; over a poor road five miles might be a very great distance. Consequently, I think it is self-evident that the better the roads of this country, the better it will be for the fruit growers as well as those who produce grain and cheese and all other agricultural products. And especially at certain times of the year with perishable fruit, you know the importance of being able to reach markets that are at some distance from you; so that I am not surprised that the fruit growers as well as those engaged in other branches of agriculture are beginning to feel an interest in this great question of the importance of the rural highways of the country. It has been said that men are very much like animals or insects. We get accustomed to our surroundings, and we begin after a while to realize or to imagine that our surroundings are always right. There is a hackneyed phrase which has been very much abused—a poetic expression which says that "Whatever is, is right." Well you know to what extent that phrase is misapplied, but I use it to illustrate the feelings of many people in this country that the roads which we have had and which we have grown accustomed to are the only roads which we might have had. Well, many of you here have had opportunities of using the roads of other countries, and you know what a contrast there is between them and the roads to which we are accustomed in this fair Canada of ours. In England and Scotland, many of you know from personal observation, the roads are wonderfully good, and are kept up at not a very great deal of expense. In France, where the people are immeasurably poorer than the people of this country, the peasantry are willing to be taxed to the extent of something like twenty millions of dollars every year to keep up their rural highways; and it is rather surprising that in a community such as we have in Ontario, where people in the aggregate and individually will compare in wealth and intelligence with those old countries, we have not as good roads as they have over there. We have made so great progress in many directions, we have spent so much upon our railways and upon our homes and in a vast number of other directions, that it seems to me we have entirely forgotten the relation to public highways to the general prosperity of the country. It is sometimes said that the climate of this country is against having good roads—that it is not possible for us to have as good roads as they have in Europe. Well, perhaps it is not; there is something in that contention; but my own observation in Scotland, where I spent a summer some years ago, and in England in this; that taking all in all, so far as roads are related to the climate, I think we can have just about as good roads here as they have over there. Of course we have to contend against the frost here, but they have to contend against almost constant wet weather.

Many of you have heard the old saw about the little Scotch boy who was asked if it always rained there, and he said, "Naw, it sometimes snaws;" and the fact is that in that country it is usually very wet; and the attrition on the roads resulting from the climate there is fully equal to the injury that is done in this country from frost and the effect of our climate. During part of the year in this country we have the roads sealed up by the snow and the frost, and during that portion of the year our roads are not suffering to the extent that the roads in England and Scotland do through the wet weather or the winter season there. Now, gentlemen, I need not dwell upon what is our system of road-making in this country. You all understand that it is what we call the statute labor system. Now, I am not going to attack the statute labor system here in order to ask you to change it; that is not my object nor the object of the association with which I am connected—certainly it is not the direct object of the association. What we want in this country is an improvement in the roads. We want an improvement in the streets of the town—in the methods of keeping the streets in the various towns and villages and cities of the country; we want an improvement in the rural highways, and we ask all people to consider intelligently among themselves what is the best system under which this improvement can take place. If you can make this improvement under the statute labor system well and good. If we can devise a better system then I think it would be in the interests of the country, and an evidence of wisdom on the part of the population to adopt that system. I think most of you will agree that there are some obvious defects in the statute labor system, which might be remedied even if it were not entirely changed. My own opinion is that it was suited to conditions in the early part of the history of this country much better than it is suited to the conditions now. Then it was necessary for our fathers to do the road-making and road-repairing by the statute labor system, because they didn't have money at that time as they have now. Of course some farmers say they have not got very much more money now than they used to have—some of them say they have not as much—(Laughter). I will not discuss that, but many of you know that there was much less money current in the early days of the country among the people than there is at the present time; consequently the system grew out of the conditions of the people at that time—that people should make the roads themselves in a way that I think is no longer necessary, especially in the older and more settled parts of the country. Now, the first objection to the statute labor system is that all the work of road-making is done practically in about one week of the year. Now, what does that mean? To use an illustration, which I have used before, it simply means this:—If something goes wrong with your house, if a door is broken in, you repair it at once; if something goes wrong with your wagon, you don't think for a moment of waiting three or four months in order to have it repaired; and so it is in reference to everything that you use, if an accident happens or repairs are needed, you see that those repairs are made at once; but you know that the roads become bad in the spring of the year—that is when the defects in the road develop. Now, what do you do? You don't go and repair them at the time or in the early months of summer when grading is most easily done, and when it is most desirable for a variety of reasons that those repairs should be made promptly; you wait until about the end of June or the first of July, after you have used those roads in their injured condition, and you repair them then—at least you do what is called repairing the roads. Some repairing is really worse than no repairing at all. (Hear, hear, and applause.) Then having done that, what do you do? You leave them for the rest of the year, and that is the end of it. Now, if the statute labor system is sound, you ought to add one rule in carrying it out, and that is that the work of repairing and improving shall go on during the most of the year; that is, that the repairs shall be made when they are needed, and when other repairs are needed that they shall be made, and the work of maintenance and improvement shall go on continually during the year. In the old country they never dream of allowing ruts or holes to remain in the road for half a year. They have a class of men there who are kept along the roadways, and you don't see a hole there that you can put your hand in until it is repaired with broken stones, and the result is that the great leading roads through England, and Scotland and France are as smooth as a billiard table during every season of the year. Now, that is

an ideal system of road making. There is another defect in the statute labor system, and it is this, that proper materials are not used. I don't need to describe to you the system of gravelling that has prevailed in this country. I can speak on this point as a practical man. As a boy brought up on a farm, I was able to do a legal day's road work when I was twelve or fourteen years old by driving a team; and I remember that the size of our loads of gravel at that time were just about in inverse proportion to the yarns which the boys used to tell in the gravel pit. (Laughter.) We were not so much concerned about getting good gravel or such large loads of gravel, as we were in putting in the time and enjoying life while the season of road-making lasted. Of course you no doubt have improved upon those times lately. (Hear, hear, and laughter.) I will say this for the path-masters, that while a great many path-masters do their work very badly indeed, because they have never given any study to the question of road-making, and while I find very serious faults not only with the system but with the result, I must give credit to a great many path-masters of the country for showing a great deal of intelligence and public spirit in the way in which they make their roads; I am glad to say that some of them more than do their duty under the system under which they do their work. (Hear, hear.) I have known many of them spend time, which really they were not entitled to spend legally, in improving the work on their road; and I am glad to say that each year is showing an improvement in the work of the path-masters and in their intelligence as a class. This leads me to say that sometimes I think the right sort of men are not chosen for road-makers by the municipal council. I don't suppose it would occur up here; but I have found that down with us in the county of Oxford, sometimes the selection of path-master was made by the members of the municipal council with a little more eye to municipal politics than to their special knowledge of the science or art of road-making. (Applause and laughter.) Of course I say that would not occur in this district,—(laughter and a voice: "Oh, no, or any other,—but it is a defect of the system which I have seen exemplified in some parts of the country. Now, my idea is, that a man who is selected to oversee the making of roads under the statute labor system or any other system, ought to know how to make roads. You don't hire a man to build a house unless he is a carpenter. You don't engage a man to make the plans of a house unless he is an architect. You don't engage a man to make cheese unless he is a trained cheese-maker. But you very often select men to make roads who know absolutely nothing whatever about the principles upon which the roads should be made; and I have seen it over and over in various parts of the country, that an intelligent path-master who had done his duty and more than his duty, who had made a good bit of road over which he had had supervision, that he would be changed through municipal influences and succeeded by somebody who knows nothing whatever about good work. And what will this man who succeeds the intelligent overseer do? He will simply go to work and do some summer-fallowing or something pretty much like it on a good bit of road. (Laughter.) We want to change all this; we want to have certain principles laid down under which the roads of the country shall be made, whether they are made under the statute labor system or any other system. One of the first requisites of good road-making under any system is drainage, which is almost entirely neglected in making our roads. In the first place the grades are not properly made, the ditches are not deep enough, and there is no provision made for drainage under the roads in places where it is particularly wet. In many parts of the country where the land is rolling, perhaps drainage is not particularly necessary; it is not so necessary as it is elsewhere. But in many parts of the country drainage is the very first essential. So much is it necessary that it does not make a particle of difference what metal you put upon the roads—whether you macadamize them or gravel them—it would not make any difference; if the bottom is not right, you know that the gravel and metal will sink in the spring and disappear, and the road will become bad no matter what you do; but if you make provision for drainage in such cases the difficulties are overcome. Then there is another defect, and that is in reference to the use of gravel. I don't know how you do it here but down with us whether the gravelling is done by the farmers themselves as part of their statute labor, or whether it is let by contract, the gravel is put on unscreened and it is dumped on to the road, very often it is not even spread. (A voice: "That

is the way it is here.") Just think of it! Do you call that road-making? It is dumped down here, and it is not even spread. Now, who are the road makers under such a system as that? Why, the poor unfortunate horses who pass over the roads under such a system as that, the owners of the horses, the feet of which are ruined by tramping over these roads, and the owners of the vehicles which are standing in scores and hundreds in the back-yards and blacksmith shops all over the country. You are the ones who pay for that system of gravelling, the description of which you know to be perfectly true. Now, every intelligent man knows that when you want to gravel a road properly you should use gravel which has not too much dirt in it to begin with; in the second place you should use gravel which has no large stones in it. (Hear, hear.) No stone should be put upon a road in the form of gravel that would not go through a two inch ring. (Hear, hear.) That is a principle which road-makers have laid down; and the folly of putting gravel on in the ordinary way and calling it road-making is shown more clearly when you consider for a single moment the value of those stones which you expect the poor horses and the vehicles to beat into the ground in time. Why, I have seen men actually paid in the county of Oxford for gravelling roads, and they would not hesitate to put on load after load of material most of which consisted of round stones as big as goose eggs or larger. I have seen it actually there as if the stones looked like so many loads of turnips. Think of that being called gravel? The men who do that sort of thing should not be paid by the public for road making; they simply should be arrested and fined for road obstruction—(Hear, hear, and applause)—for obstructing the highways of the country. Now, gentlemen, how are you to put that on? Simply use the material in another way. After a while you will use it in another way; you will use it in broken form; you will have all those stones broken by stone-crushing machinery, and you will get good roads very easily. And that just leads me to say here that sometimes the farmers are rather afraid of this question of road-making, because they say it is going to lead to enormous cost. Now, coming to the question of expense with farmers, and to the imposition of taxes upon farmers, I may say that it is a rather delicate subject. It reminds me of the story that is told of the darkey preacher who proposed to speak on the text, "Thou shalt not steal," who was told, "Brudder, don't you do it; if you preach upon that air text here, you will throw a coldness over this whole meeting." (Laughter.) But if time allowed I could show that the improvement of our highways in this country will not only not impose any additional burdens upon the people of the country, but it will relieve them of a great many burdens that they now bear. It is not a question of taxing you more for good roads; it is a question of relieving you of the tremendous indirect taxes which you are now paying in loss for a system of bad roads. That is the object of road reformers and of the association which I have the pleasure to represent here. Now, just take this question of broken metal. In Oxford county we have around the gravel pits and on the farms in most parts of the country, almost sufficient stone to macadamize the roads of the whole district, but we cannot utilize it. Now, what would be the result if we undertook to utilize it? First of all if we had proper machines by which all the roads would be properly graded, then they would be properly drained we suppose, then supposing we had machines to crush all these stones, and then we had rollers to roll it and put the material on firmly and compactly, what would be the result? Why, sir, it would be an enormous source of revenue to the farmers who have these stones lying waste. It would pay the farmers to draw these stones to the road sides, even if they only get the cost of hauling. It would be so much money in their pocket; and I believe in a few years when we get proper road machinery at work and proper ideas disseminated among the people on this question, you will find the farmers of this province in many parts draw very considerable revenues from selling the useless stones which they have upon the farms for the purpose of improving the roads, and thus increase the value of their property. Now, I am sometimes asked by what system we could carry out the improvement of the roads? Would I urge the people to have macadamized roads in all parts of the country? Well, no, I would not, because macadamized roads are not necessary. I should like to see the leading roads of the country in many parts macadamized. For instance, in many parts of the county of Essex where they have low clay land, it is absolutely necessary to macadamize the

roads; but in a district where there is good gravel it is not necessary to go to the expense of macadamizing the roads. I believe that the future system will be something like this, by which we will obtain better roads than we have had in the past. I think you will see the county councils, for instance, carry out the same principle in reference to roads which they do now in reference to bridges. You know that under the municipal system certain bridges belong to the county and some to the township; and I believe if the counties would take the leading roads running through all the municipalities and that those should be under the control and direction and supervision of the county, and that the other roads in the various townships should be under the control of the councils of the various townships, a radical change and a vast improvement would be made in our system of roads—an improvement almost as great as we have seen in the countries of the old world. Now, gentlemen, the loss from bad roads is not all financial, nor is the gain from good ones all financial. I believe good roads have a very important influence on the public outside of the matter of gain or loss. They have a very great social effect. You know that the farmers are really the most isolated class of the community in this and in most other countries, and I know the condition of the farmers in such counties as I have described—in the county of Essex for instance—is almost pitiable through the fact that they are practically tied up on their farms during several months of the year. The letters which members of the association get from there describe the most extraordinary state of things during the wet season, for instance. Now, what is the result? Good roads would not only relieve these men financially, and in reference to the carrying of their products to market, but it will enable them to associate with one another, to move about, and in that way promote social intercourse, and have a more marked effect upon the social and the educational and the religious habits and life of the people; so that from every standpoint roadmaking is of infinite, direct and indirect importance to the whole people of the country. Now, with reference to this particular association let me say one word in reference to the roadsides. It has always been a matter of surprise to me that there was not a love of the beautiful to this extent—that the roadsides of the country should be improved a little as well as the roadbeds of the country. (Hear, hear.) Now, those of you who have come from the old country know that a great deal of the beauty of the landscape is due to the fact that not only are the roadbeds smooth, but the roadsides are just as smooth as a lawn—they are simply long winding bits of lawn going through the country between pretty hedgerows. Now, in this country if we engage a man to do some ditching along the roadside, we allow him to throw up the dirt and the stones in great heaps and leave them there. It would be just as easy, and it would be vastly more attractive, if he would smooth those down in such a way that the grass would grow over them, and that the road-sides would look neat and beautiful. (Hear, hear.) Some people may say that is not an important matter. I say it is a matter of infinite importance. I ask any of you grey-haired people who have come from Scotland, or England or Ireland, what are the pleasantest recollections you have about the country? Is it not the pretty hedgerows? Is it not the pretty winding roads with their level lawn-like sides that linger in your memory? Who, when looking back on their childhood and the distant home, ever get up their enthusiasm—any glow of home feeling—over the snake fences such as you see in Canada, and the rough and uneven road-sides covered with weeds? (Laughter.) Do you think that that sort of thing ever promoted love of home in any people on earth? And I will tell you seriously that there is no more important aspect to this question than the development of home feeling and love of country in this Canada of ours. (Hear, hear, and applause.) As a young Canadian, while I have had the good luck to see a good of other countries of the world, the effect of it has always been to increase my love of home and of this Canada of ours, (hear, hear); but two things have grieved me: the constant tendency of our boys and girls to go into towns—(hear, hear)—and the tendency of our boys and girls to go to the United States. (Hear, hear.) Now, I maintain that anything that will beautify the rural districts of this country and increase the intercourse of our people, that will make it easier for the young people to go to the school and the older people to go to church, that will enable the young men to drive long distances and take their girls out over these roads—anything that will increase the

pleasure and the taste of young people in this country increases a love of home, and develops the spirit of patriotism in this country. (Applause.) I believe that the tide has turned in reference to these matters; that after a while the young people will be more anxious to stay upon the farm, and that we will keep them upon the farm more than we have in the past. So I say it is of infinite importance that we do all that we can, not only to promote the material prosperity of the people by enabling them to sell their products in the nearest market, and at the least loss in transportation, in order to cut down their expenses in moving their goods; that it is of infinite importance to create in their minds love of home and all there is on the farm and in the rural districts. In conclusion, let me say that we have formed an association for the promotion of road improvement in this country, and I would like if this Fruit Growers' Association would show their fraternal interest in us and their interest in this subject as one relating to your own welfare by appointing delegates who will meet with us at the convention in February next. I believe that we, like you, are engaged in a very important work. We don't want to create revolution in the country; we are not ambitious to change systems in a day; our desire is simply this, to make the farmers of the country realize that this is their question, that it is affecting their interests, and that it is one that they can solve, and the solution of which will do them a vast amount of good, and I am glad to say that we have got the Department of Agriculture to recognize our work as it is recognizing your splendid work. They have recognized our work by putting on their list of speakers our question in the farmers' institutes all over the country. The directorate of our association is mostly composed of practical farmers, and among the speakers we have chosen on this question most of them are plain, practical farmers with clear heads and plain speech who realize that this is their question, just as the farmers of the United States know that it is their question; and I believe that what they are doing will have a most important influence in this country in a few years. I am delighted to have been with you, and I hope that the few rambling observations I have made will increase your interest in this question, which I am sure very closely and very fully affects the interests of all of you. (Applause.)

The PRESIDENT: We shall give an opportunity for any questions to be asked, though I do not see that there is room left for further questioning or discussion on this matter. Mr. Pattullo has pretty thoroughly covered the ground.

Mr. BOULTER: I would like to ask if the present system is done away, what line they propose to adopt—whether by direct taxation, putting a force on the road and keeping it in order, or taking the present system of statute labor and employing people by it?

Mr. PATTULLO: The Association was only formed this year in February, and that is a matter that we have not yet entirely thrashed out, and the members of the Association feel that it is much better to discuss this matter in a general way with the people before we commit ourselves to details or plans. This is a democratic country, and the laws which may be passed in reference to road-making are simply those that will come from the people, and I may say from the farmers of the country, who are chiefly interested in the matter. The Association has carefully refrained, and as president I have strongly advised, that at this stage we shall not commit ourselves to details of legislation, which should be the result of a great deal of wisdom and discussion in the future.

Mr. CASTON: I think this question of road-making is one of the most vital importance to us all as fruit growers, because we want the very best roads for the handling of our fruit and the hauling it to our railroad stations. Two or three points in Mr. Pattullo's address should be taken to heart by everyone of us; first, in regard to drainage; second, in regard to ditching. They make usually a square ditch, and it almost invariably caves in. Then in regard to the common stones of our road. If I was a manufacturer of vehicles or a horse-shoer, I would advocate the present system; but not being so let us do away with it. It is a most destructive thing, and people little calculate the amount of damage it is doing to vehicles or horses' feet. If you are on the road and notice fifty or a hundred horses going by, you will be surprised to notice how many of them are lame, owing largely to this cause. I feel like moving a vote of thanks to the

gentleman who has come all the way from Woodstock here, and I hope that the committee of resolutions will take a note of it. (Hear, hear.)

The SECRETARY: I think the least we can do as fruit growers to show our interest in this matter—because I am sure we are as interested in the roads as anybody, we have more delicate products to carry over the roads than most people—would be to respond to Mr. Pattullo's suggestion that we send a delegate to the next meeting of the Association (hear, hear) who will not only give our view of the matter, but also bring back a report to us, so that we may be still further in sympathy with this work. I am sure this will be taken up by the directors.

The PRESIDENT: That was my idea when I asked Mr. Pattullo to introduce this subject here. I noticed that this question had been brought into the Fruit Growers' Association in the United States. My opinion is that we have as good a country, or a better one, than they have over there, and I believe we are as good a people or better than they are there (hear, hear, and laughter) and I didn't want to be behind them in anything, and when they were taking this advance step, I thought we could keep up with them, even if we didn't get just a little ahead of them. I am pleased to have our friend, Mr. Pattullo, here, and to see that you have taken such an interest in the subject he has introduced. Do you think that matter of sending delegates should be taken up now?

The SECRETARY: I think it should be left for the directors at their meeting to-morrow.

THE PACKING AND SHIPMENT OF FRUIT.

Mr. C. C. JAMES, Deputy Minister of Agriculture, spoke as follows:

In beginning his address Mr. JAMES referred to the chart used by Mr. Craig, on which the artist had in one case printed "unprayed" instead of "unsprayed." He stated that the man who made the chart appeared to believe that after all "praying for fruit" and "spraying for fruit" were one and the same thing. Certainly the results given by Mr. Craig appeared to prove that in the average season spraying was absolutely necessary if good marketable fruit was to be obtained. Mr. JAMES then quoted at length several printed market reports from London and Liverpool in reference to the sales of American, Nova Scotian and Canadian apples (*i.e.* apples from Ontario and Quebec). In one case the apples sold in Liverpool ranged in price from 30 cents to \$3.35 per barrel, the difference resulting from variety in quality and method of packing. It costs over \$1 to take the apples from the farm to the British dealer. In many cases apples were sold from the farm and shipped abroad that should never have been allowed to leave the farm; in fact they should never have been grown. Sales of American Baldwins were quoted varying from 75 cents to \$3.60 per barrel, which showed that the difference in price depended not so much upon the varieties sent as upon the quality of the fruit and its packing. In this connection the speaker submitted to the meeting the consideration of the question: Whether all apples should be packed in classes in standard barrels and marked with the packers' names. The importance of the fruit trade to Ontario was touched upon and the value of spraying as brought out in the previous discussion was emphasized. From many reports the following were taken and advanced as proving that first-class fruit brings good prices in Britain, and that poor fruit does not pay for its transportation.

First is given a table of sales of Canadian apples at Liverpool in the week October 8th to 12th, 1894:

CANADIAN APPLES, LIVERPOOL, OCT. 8-12, 1894.

No.	Price per bbl.	Total.	Remarks.
39	\$0 30	\$11 70	Very wasty.
1	50	50	Wasty.
24	60	14 40	Slack and wet.
33	75	24 75	Wasty.
20	1 00	20 00	Slack and wet.
29	1 25	36 25	Wet.
9	1 35	12 15	Slack and wet.
39	1 40	54 60	All slightly wet.
21	1 80	37 80	Various kinds slack.
10	2 00	20 00	All tight.
12	2 90	34 80	XXX Hubberts, tight.
28	3 35	93 80	XXX Colverts, tight.
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265	\$1 36	\$360 75	
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71 barrels sold for			\$186 40 (\$2.62)
194	"		174 35 (90c.)

The whole shipment averages only \$1.36 per barrel.

The next quoted was two weeks later, and the sales were as follows. All these apples were evidently handled at a profit :

CANADIAN APPLES, LIVERPOOL, OCT. 22-26, 1894.

No.	Per bbl.	Total.	Remarks.
15	@ \$4 50 =	\$ 67 50	Tight, King's Fallwater and Blenheim Pippins.
20	" 3 55 =	71 00	Tight, good varieties, XXX.
25	" 3 15 =	78 75	Tight, Baldwins XXX and Cooper's Market XXX.
7	" 3 00 =	21 00	Samples.
61	" 2 85 =	173 85	47 tight, 2 slack, 12 slightly wet (29 Snows).
8	" 2 25 =	18 00	Wet and slack.
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136	" \$3 16 =	\$430 10	

To show that great variations are found in the same kind or variety of fruit, the following sales of one variety, Baldwin, were made. This was American fruit. Canadian Baldwins usually sell a little higher than American :

AMERICAN APPLES, LIVERPOOL, OCT. 22-26, 1894.

Baldwins.

No.	Per bbl.	Total.	Remarks.
28	@ \$3 60 =	\$110 80	Fancy, select.
26	" 3 35 =	87 10	Choice, new barrels.
45	" 3 25 =	146 25	Fancy, select.
30	" 3 05 =	91 50	Tight, new barrels.
77	" 2 75 =	211 75	Slack.
10	" 2 35 =	23 50	Slightly wet.
20	" 2 10 =	42 00	Wet.
10	" 1 15 =	11 50	Slack and wet.
4	" 75 =	3 00	Wasty.
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250	" \$2 91 =	\$727 40	

The SECRETARY : I think we ought hardly to pass this subject without appointing a committee to consider it. I think the points mentioned by Mr. James are very important. I think it is possible to answer the three questions put by the Minister of Agriculture, that the barrels should be of regular size ; that they should be graded into one, two and three, and that the name of the shipper should be upon the barrels. It works into the question of the apple inspectorship. I believe it is possible to have this whole thing worked to our satisfaction and to the benefit of the country at large, and I would move that Messrs. A. H. Pettit, George Fisher, of Burlington, and A. M. Smith, of St. Catharines—all of whom have been and are more or less interested in apple shipping—should meet before to-morrow, and see if they can put this matter in some shape to bring it before us for our approval.

Mr. CASTON seconded the motion.

Mr. SMITH suggested the name of Mr. Dempsey in his place, and this was accepted by the secretary, as Mr. Dempsey is one of the largest shippers we have.

Mr. PETTIT suggested that Mr. Boulter's name be added as that of an extensive shipper.

The SECRETARY suggested Mr. Fisher, of Orillia, and Mr. Pettit suggested Mr. Caston, of Craighurst. The committee of six were then appointed, with instructions to report to-morrow.

The meeting adjourned at five o'clock.

SECOND DAY—EVENING MEETING.

The music hall was crowded for the evening meeting.

President RACE took the chair and said : Ladies and Gentlemen, it is highly gratifying to the Ontario Fruit Growers' Association to find that their coming here has awakened such an interest in this community, as manifested in this gathering to-night. We have never seen anything like this before, and being all young men, we feel quite nervous and shy in the presence of an audience of this kind. (Laughter). We have looked upon Hamilton for some years as our best point, but Hamilton never touched this—cannot come near it. (Applause). The reception we are having here makes us feel as though we would like to come back again. (Hear, hear, and applause). We have a pretty full programme to-night ; I hope you will be pleased with it. If you are as much pleased with the programme as we are with the audience, I know that this will be a mutually satisfactory meeting.

GEORGE THOMSON, Esq., Mayor of Orillia, then gave an address of welcome. He said : It is a pleasure indeed, for me to welcome you to our town. We are exceedingly pleased to see your with us, and as the crowded audience shows, the people of this town are interested in your work. We are pretty well to the north part of Ontario here, but still the display which is exhibited on the table in the outer room, shows you that we are not too far north to grow, or appreciate good fruit. This, I have no doubt, is a surprise to some of you. You mentioned in your opening remarks, sir, that Hamilton, or some other of those small towns (laughter), didn't extend to you such a cordial welcome. I wish to tell you that in this town we don't do things by halves, this being a go-ahead town, and we try to keep up the reputation. I am sure it is a great pleasure to all the citizens of Orillia, to know that you selected this place for your meeting this year, and I hope that your deliberations will prove useful to the Association. Once more I welcome you on behalf of the town of Orillia. (Applause).

President RACE : In speaking for the Fruit Growers' Association of Ontario, we accept, with the very highest appreciation, the welcome which has been extended to us,

not only in the words of your mayor, but in your presence here to-night. He remarked that it was no doubt a surprise to some here to see such a turnout. Now, I can assure you that it was not altogether a surprise to us. We had partly anticipated something of this kind. When you sent a deputation over to Peterborough a year ago to invite us here, we rated up those gentlemen you sent, and made up our minds then that if they were a fair indication of the enthusiasm and the interest of this community in fruit growing, we would meet an enthusiastic and deeply interested people here. Now, we are pleased to know that we didn't rate those men mistakingly. We find them enthusiastic and deeply interested in our work, and we find that they were a fair indication of the people whom they represented when they went to Peterborough, and the promises they made there have been so well filled that we have nothing left to desire. I am sure we have learned since we came here things that have been of profit and pleasure to us. We had no expectation of seeing so many things of interest as you have shown. We didn't expect to see such a fruit exhibit. We didn't come out here to-night in the spirit of conquest or of confiscation, but I can assure you if Moses had been among us, he would have strongly tempted us to come out here and possess this land (applause), because I do not know that Moses even could have been better satisfied with anything than the exhibit of fruit that you have made here to-day, showing the capabilities of this section of the country. We have the grandest country in the world here in Ontario (applause), and I have frequently said we are the best people in the world. (The applause was so loud as to cause a dog in the room to bark). I believe that even a dog can appreciate words of that kind. (Renewed laughter). I can assure you of this, that we are the most deeply religious people in the world, and I find in all sections of the province of Ontario where I have been, that there is not only a religious sentiment prevailing among the people, but that there is love of the beautiful in nature. I have been asked, since coming to the platform, to tell a little experience of mine in one of these northern towns a year or two ago. I was addressing a meeting something similar to this, and I was speaking about beautifying the home surroundings, and I asked why every farm home should not be beautified with all those beautiful things that the Creator has placed within our reach. I was also speaking as to the advantage of having a fruit garden. I said, is it possible that the farmers of this country have neglected a taste of this kind? Is it possible that the farmers have not a taste for a nice strawberry and a nice dish of cream? and I made this challenge: Is there a farmer in all this audience who would turn up his nose at a nice dish of strawberries and cream, provided by his wife and daughters from their own dairy? and I was almost dumbfounded by a farmer to my left, a few seats back, holding up his hand. (Laughter). Now, you can just imagine the position I was in. I didn't expect any such response to my challenge, but I had made the challenge and it was accepted, and there was the hand. What was I to do? My friends that were on the platform with me laughed very heartily at me, and the audience laughed. The more they saw my confusion the more they laughed, but it was only for a moment or two. As soon as I could collect myself, I stepped to the front of the platform and said, As they say at a camp-meeting, "If all the praying brethren will just come to the front, here and gather round the front, we will pray for that man." (Laughter). That hand was down in a moment. (Great laughter). When you begin to talk about praying for any man, he generally wilts at once. (Laughter). A good Scotch friend on the platform—John Mac-Millan, of North Bruce—clapped his hands and said, "Capital; man, if it hadn't been for your camp-meeting experience that man had you floored." (Renewed laughter). So you see now, there is something in having a love for the strawberry, a love for home surroundings, and having experience in a Methodist camp-meeting; if it hadn't been for that I would have been in a difficulty there that I could not have got out of. I thank you again for this very kind welcome, and we will remember you kindly as long as we live in this beautiful land.

Mrs. McKINNEL read an excellent paper on "Flowers":

FLOWERS.

Flowers, a writer has quaintly but most aptly designated as "God's smiles," and it requires no very great stretch of imagination to think that after the countless ages of time, during which this world of ours emerged from the chaos and darkness of its early existence and gradually developed into a place of beauty and fertility; when its mountains and valleys, clothed with verdure, and all fruit-bearing trees and vegetables necessary for human existence were made perfect; when the Great Creator of all this beauty and perfection pronounced it "good," then, from deepest valley to mountain top burst forth myriads of nature's most lovely creation, the many-hued flowers, which, not a necessity of existence, God gave to His children as a luxury to gratify the love of the beautiful which He implanted in its fullness in the souls of His first sinless creatures.

Much might be said of the value of many flowers for medicinal and other purposes, but in this paper I wish to speak of the influence of flowers as a whole upon the human family. First among the blessings they have brought to mankind is their refining influence. All the beauty of apparel and surroundings which wealth may enable its possessor to indulge in pales before the pure and perfect loveliness of a mass of flowers. Even Solomon in all his glory was not arrayed in such perfection as the simplest lily of the field.

The refining influence of flowers was well illustrated in the case of the untidy wife of an English cottager. All counsel as to the keeping of her home more tidy had failed. At last someone presented her with a little plant in bloom, a scarlet geranium I think it was; the gift was accepted and placed upon the window-ledge, and as the mistress of the house gazed at her new and pretty possession, the incongruity of its pure beauty beside her exceedingly dirty window struck her, and the casement received a long-needed cleansing. The clean window now only showed up the dirt of the floor and all the surroundings, which were gradually made to match the window and its little floral gem. Now the desolation of the exterior of the cottage began to be felt, and before long the yard was cleaned up and planted with cottage flowers. The home, which had been a disgrace to the village, became a little Eden to cheer its inmates and gladden the eyes of each passer by. The cultivation of flowers by the amateur florist has ever been found to be a most health-giving occupation. Many a weary mother has found health and lengthened life by spending a few spare minutes in cultivating her much-loved flowers in the borders around her doorway in the summer time, and caring for her window plants in the winter. Indeed, mother nature is a grand physician, rewarding the labors of those who love her with renewed vigor. In no other employment can we produce so much beauty with so little labor. The painting, the fancy work, shall I say the crazy quilt, are all beautiful in their places, but represent many hours of time bestowed upon their production, but the lovely floral gem given a little loving skillful care will develop fresh charms every day, and at last burst upon us with a wealth of beauty or a breath of fragrance beyond the power of art to produce.

In speaking of fragrance, most wonderfully has God given this gift, generally not to the flowers most prized for their showy beauty, but to the pale cream, or white blossom, or to the insignificant little bloom which would be passed unnoticed did it not appeal by its fragrance to our sense of smell.

In tropical and semi-tropical countries where the night hours are the most enjoyable to the inhabitants, God has filled the forests and glades with lovely night bloomers as the cereus, the datura, moon flower, nicotiana, and many others, nearly all of which are pale cream or white, lovely as messengers from the spirit world and rich with a perfume peculiar to themselves, bringing to the weary mortal a feeling of delicious rest and drowsiness.

Much has been said and written for and against the keeping of flowers in the living and sleeping apartments of the home. That they are not injurious is now generally allowed, indeed, I think they act as fine tests of the healthfulness of the home. Keep your house too hot or too cold for your plants and your children suffer, while the glorious

sunshine which must be freely admitted to bring your flowers to perfection brings also (other arrangements of the home being equally pure) the roses of health and beauty to the cheeks of your little human blossoms.

How deeply the love of certain flowers sinks into the heart of man and thrills his whole being when brought under his notice, we can gauge by remembering the flowers which have been chosen as national emblems, how the Englishman loves the rose, the Scotchman his thistle, the son of Erin the Shamrock, the Frenchman the fleur-de-lis, and the Jap his lovely chrysanthemum, though it may not be his national emblem.

The man or woman who fills the window or the front garden with lovely blossoms is a public benefactor. No one can tell how many thousands of hearts have been cheered and lightened as the eye of the passer-by rested on the bright blossoms and took in the message our Father ever sends through their eloquent silence. I must not forget that beautiful mission, "The Flower Mission," which has sent its loving messages to hospital cot and the couch of all the sick brought under its notice. How much pain has been for a while forgotten as the sufferers drank in the beauty of the little messengers, who would ever remind them that He who clothed them with such beauty was also ever mindful of the sights and tears of His suffering children.

In eastern groves where poetry dwells,
 They've given each flower a tongue ;
 Invested thus, a mystical charm
 Round the simplest blossom is flung ;
 The Indian pink speaks of personal grace,
 The mignonette beauty of mind,
 The citron depicts a beautiful face
 When joined to a nature unkind ;
 The ivy and wallflower steadfast friends
 In adversity's hour prove true ;
 Beware of the foxglove, he seems a friend,
 But in heart he is false to you ;
 Knight errantry's spirit is imaged forth
 By the monk's hood stately and bold,
 The gentle mimosa is courteous and kind,
 While the lettuce is selfish and cold ;
 And now, e're I close, a boon let me ask,
 Cherish the flowers which have prompted my task.

The PRESIDENT: I don't believe there is a man or woman in this community that needs praying for in the connection in which that gentleman out north that I spoke of needed praying for. With such a true lover of nature among you as the one we have just listened to, I don't think you will ever be charged with neglecting the beauty of nature. That is a delightful paper, and we take pleasure in laying our hands upon it for our report for the coming year.

Miss HODGE then read a paper on "Floriculture as a Business for Women."

FLORICULTURE AS A BUSINESS FOR WOMEN.

This is quite in keeping with her capabilities and tastes. What more congenial occupation for women than caring for the beautiful plants and flowers which the Creator of all has made! Moving this one into the sunshine, picking off dead leaves from another, giving all a motherly care! Peering into the face of this little flower and wondering how such lovely hues can possibly evolve themselves from such a homely little plant! Women seem endowed with a flower-loving nature, and never are quite content but when the proud possessor of the most beautiful plants that can be obtained. In these days of social progress new and broader fields are opening out for the employment of women, and they are not limited to the teaching profession, which has always been crowded—the fine arts, manufacture of artificial flowers, designing and making of bonnets and gowns, or, as

a last resort, the more menial and heavy work. But now, as the years go on we see the women of our country taking up the professions. They are lawyers, doctors, and even candidates for municipal honors, they are installed as clerks in stores, typewriters and bookkeepers, and are now beginning to take a place as professional *florists*. The business of floriculture is not crowded, and there is always room for bright, thorough-going, flower-loving women to make it a success. A natural correct taste is one of the requirements, and in recognizing the beautiful in color and form, and, above all, the harmonious and artistic combinations of these, women excel, and so are unequalled as designers and decorators in this line.

There are some women to-day throughout the country doing a profitable business as florists, being themselves both growers and business managers. Though we often hear arguments to the contrary, we have in the ranks of women a large percentage as agile, clear-headed and determined, and who might just as confidently expect success, as the men who are in business. This being the case, why may they not engage in a business so eminently suited to their refinement, taste and powers as the cultivation and commerce of plants, flowers and seeds?

An absolute necessity to success in the culture and disposal of plants—and without success there cannot even be pleasure—is a complete mastery of details, and this we assert, woman has pre-eminently—as is proven by her able management of the multitudinous duties which crowd each other in the daily routine of household work. Then to study the nature, habit, and all the conditions and requirements of the many genera of the flower world is a delightful exercise of the mind, and women delve into minutiae of the business with a zest that few men show.

A high standard of excellence is imperatively demanded by women, and where does the critic find a broader field for indulgence of discernment, comparison and taste? To be a florist should not be thought to be one whit less in importance than to be a dry-goods (or any other goods) merchant. The very nature of his calling should make him better, as intimate association with plants and flowers is in itself elevating. Many people associate with "florist" the idea of "gardener," a word which to them has meant a kind of "Jack of all trades," who looked after the cow, drove his master down town and back every day, attended the house furnace and took care of the greenhouse, kitchen and flower gardens in *his spare moments*, and was supposed to have vegetables and flowers ready for all occasions. Occasionally one would see this advertisement in the country papers: "Wanted—a gardener to look after the cow and horses, and make himself generally useful." But these are getting rare—like the Dodo bird, almost extinct.

A woman, to be a successful florist, must be on the alert for all the new and rare things in her line, and make specialties of plants which, after a fair test, she finds to be quick sellers and to give customers the best satisfaction. Again, patrons are of the most refined class of society, hence, in business associations, a florist mingles with people of taste and culture, which is one of the strongest proofs of the occupation being a suitable one for woman. In summing up briefly we find that women who wish to earn a livelihood may be successful florists. 1st. Because the business, from its nature and surroundings, is a suitable and elevating one for them. 2nd. Because they are naturally endowed with a plant-loving faculty, and to be successful one must have a congenial occupation. 3rd. Because they have the command over details necessary to the wants of so many and varied tender charges. 4th. Because when she has ventured into the, for so long to her, foreign realm of mercantile life, she has been found to be the peer of man, who so long has held the territory.

The PRESIDENT then introduced Mr. PATTULLO of Woodstock, to speak on the aesthetic side of roadmaking. In doing so he remarked that nature intended us to enjoy all the good and beautiful gifts bestowed upon us. We have been given a beautiful country here; we have denuded it of its forests; and while we have so many trees and plants and shrubs given for our pleasure and profit, it is our duty to make the best possible use of them; and there is nothing that adds so much to the beauty of a country as the planting of trees after the forests have been cleared away, and especially planting trees along the roadside.

TREE PLANTING IN RELATION TO ROAD-MAKING.

Mr. ANDREW PATTULLO of Woodstock, after some introductory remarks as to his address given during the day, said that there is not only a monetary or material aspect, but also a social, even religious and educational aspect, to the question of roadmaking, which is closely related to our national life. The national life and the tastes of a people and the love of home are largely dependent upon the character of our roads. From outward objects our love of home and of country always springs; and in the interests of patriotism as well as of home life, we should do all we can to make our homes and farms and roadways as beautiful as those in any country in the world. I believe that one of the agencies to keep young people upon the farm is to make farm life and all the surroundings of the farm and all the rural parts of the country more attractive; and it is the truest and highest patriotism on the part of those who see these things in this way, to endeavor to bring before the people of this country the enormous importance of the improvement of our rural highways, and the practical bearing of this question upon the material as well as the higher interests of the people. Now, as to the question of tree planting in its relation to roadmaking. The trees in the form of avenues are rather the enemies of good roads than its friends. I don't want you to carry away the impression that I should not like to see you beautify the country by planting trees along the roadsides; quite the reverse, but you should always bear this in mind, that the trees should be planted some distance apart, and not in the form of thick avenues, because if they are planted too thickly, or if they are of that nature that the shade is too dense—maples for instance—unless they are carefully cared for, if planted too closely they make too much shade which produces too much dampness, which is the cause of bad roads. Don't be ambitious to get avenues of trees along each side of the road so much as to get them here and there. If you want to plant avenues, plant them on the north side of the roadway so that the sun will get at the road and the shade will be the other way. That is a most important practical detail that is sometimes forgotten. In England and other countries of Europe, they rather prefer to have their roads on the hillsides or laid out in such a way that they will not be shaded, and consequently the damp will be avoided. If you want to plant wind-breaks in the country, plant them one field back from the road. But it adds enormously to the beauty of the roads and to the picturesque appearance of the country, and to the cultivation of the beautiful in the hearts of the people, that there shall be trees along the road sides as well as in the fields and along the fences throughout your farms; and I think that you ought to be a little more liberal in this way than you have been. In the interests of roads as well as of fruit growing, I would advise you to plant fruit trees along the roads of this country everywhere. (Hear, hear.) Some will say, the boys and tramps will steal all the apples. They won't do anything of the kind. They will simply take what they want and leave the rest—and there will be plenty left. You would make a great many happy boys, and a great many happy tramps in this country, and you would do them no harm, but a great deal of good. Perhaps if you fed the tramps with fruit from fruit trees along the roadside, you would have less to do in taking care of them in what we euphemistically call the "coolers" of the towns and cities. So I am very strongly inclined to plant fruit trees along the roadsides as well as the planting of maples and basswoods and cedars and other trees. In California, some years ago, I was greatly struck with the fact that there are no fences there, and yet there are thousands of acres of oranges and all sorts of fruit in that country. There is not a fruit thief in that country, because they don't require to steal—they just take all they want, and they don't take any more than they can use for immediate purposes. They are very much happier without having to break into places as we have to here. (Laughter.) This question is coming to the front as one of practical and national importance; and the Association which I have the honor to represent, has entered upon a most important work in the interests of the people. (Hear, hear.) To my pleasure and surprise we see the farmers taking this question up as their own; and I rejoice in the increasing intelligence and power of the farmers of this country; and when they make up their minds to have good roads in their own interests they are going to have them. I think that in a few years those who are opposed to road improvement will be in a hopeless minority.

THE HIGHER HORTICULTURE.

Mr. C. C. JAMES, Deputy Minister, said: While Mr. Pattullo was speaking in regard to the planting of our roadsides with fruit trees, I remembered that in Spain they have an unwritten law that whenever a fruit is eaten the seed or the stone must always be planted; and we are told that the rustic people of that country are accustomed to push in with their heel the stones of the fruit that they have eaten along the roadside, and as a consequence for miles and miles the roadsides of Spain are lined with fruit trees, which at one season of the year are laden with magnificent blossoms, and at another time with luscious fruit. (Hear, hear.) When I was at the Agricultural College a few years ago, we had there an animal to which we always looked with a little more pride, and in which we had a little more interest than any other animal standing in the two rows of stalls; and why? Because that animal had come from the Queen's herds in England. Now, you no doubt know that the Queen is one of the best farmers in England. You also know perhaps, that the Prince of Wales is a rival to the Queen in farming; and the other day when the Duke of York was married he must needs go and buy a farm also, and set up for himself; and it was only within the last week that we read that the Premier of England, Lord Rosebery, had just sent a fine bunch of fat bullocks, 142 in number to a large butcher firm in the city of Edinburgh. Now, why do I mention that? Simply to show that in England and Scotland, as well as in some other countries of Europe, agriculture is not a profession or calling beneath the dignity of anybody in the realm, that in fact no one considers himself a true gentleman unless he has a large and well-stocked farm to which he can point as being the owner. When we come to this country do we find exactly the same state of affairs or the same opinion? A short time ago we had an election in this province; and before the full force of the farmer's vote was felt, we found here and there that the farmer was held up almost to ridicule; he was dressed up perhaps in a coat that might have served a year or two ago for an old scare-crow on the farm. The hat upon his head was rather rusty. One leg of his trousers was in his top boots and the other was outside, and his whole appearance was one that was not of the most attractive. But the elections went by and the farmer was suddenly found to be a very important man in this country; and now how do we find him pictured? What kind of a man is he now? Well, the best way that I can do is to illustrate it by this noble band of farmers we have upon the platform. (Hear, hear). Ladies and gentlemen, these are some of the farmers of this country now. (Hear, hear and laughter). Perhaps, however, they might object and say: "We are not farmers; we are fruit growers,"—and that illustrates just one little point I want to make—that the fruit growers of this country consider themselves—and I think with no little justice—the aristocracy of the agriculture of this country. There are two reasons for this. In the first place fruit growing has been a very paying industry, with some exceptions, with here and there bad years; but taking the average of the years through, I think that fruit growing has been as profitable as any other line of industry. Those men who have gone into fruit growing in favorable localities, who have gone into lines that were adapted to those localities, and have adapted themselves to their work, have in the majority of cases made a success of their work; and what is the result? After you go through a section of the country that is given over wholly to fruit growing—such a section, for instance, as the Niagara district or the district of Essex or Kent, where we have really no farmers, but altogether fruit growers—what will you find? You will find there that those men are living in rather fine houses—in just as good houses as we find in our towns and cities, and that those houses are as well furnished as any houses in our towns and cities. The surroundings are very pleasant; they have their well-kept, well-trimmed lawns, and even flowers, here and there shrubbery, neat hedge fences, and so on; and you think perhaps you have come upon the country residence of a city millionaire. Not at all; it is the residence of one of those fruit growers who is living there upon his fruit farm. You will find a piano there; you will find a man well-dressed; as I have already illustrated, these men are living examples of that. (Laughter.) You find them hale, hearty men—I don't think you would take any objection to their general appearance or their looks. (Laughter.) They seem to enjoy

life pretty well. (Renewed laughter.) There is nothing like teaching by example. You find even in some places a billiard table here and there for the amusement of the boys. When you go through that whole region, you will find few men who are complaining about hard times. Well, of course they are complaining about the low prices—you can't find a fruit grower or a farmer or a dairyman or a stockman who is ever satisfied with the prices, of course—and perhaps there may be some of the same nature in connection with our manufactures and other kinds of work in towns and cities; but these men have about them an air of satisfaction and contentment and enjoyment in their work which I don't think you can find equalled in any other part of this country, unless it may be in a few sections where dairying has been for some time carried on upon a scientific basis, and where the results have been of a most generous nature—such a district as that from which Mr. Pattullo comes. These men, I say, then, are the "Upper 400" of agriculture. (Laughter.) Now, why have they come to this locality? What interest have you in their work? The fruit growing of this province is not confined to the Niagara district. I believe you can beat them in the growing of apples in this district, but they can beat you probably in the growing of grapes, and certainly in the growing of peaches. There is a district away to the west from which some other members come, known as the Essex and Kent district, famous for its apples, its grapes, its peaches and other fruits. Then we have the district along the Georgian Bay, not far from here, famous for its plums. We have in the Bay of Quinte district, from which Mr. Boulter comes, a magnificent district for fruit culture. A little east of Toronto we have a district famous for pears and apples. So if you go over the entire length and breadth of this land you will find in this older part of Ontario soil and climate specially adapted to the growing of some kind of fruit to what we might call perfection. Well, they have come here to learn something from you in regard to your fruit growing, and they have come also that you may learn something from them in regard to their methods of fruit growing; and I simply say this as one who has attended these meetings for a number of years—a sort of unattached member of this association—that if the people of Orillia and the vicinity allow this organization to go away from here without crowding this room from day to day and drinking in all the information that can be got, they will perhaps have cause to regret it all the days of their life. It may be ten, twenty or thirty years before this association will come back again. Now, you may say they cannot do very much. Perhaps they cannot do very much for each individual; and yet they can. But suppose we look at this question in its broad aspect. In Ontario, we have 175,000 farmers, that is, men who are cultivating farms 75, 100, 125 and 150 acres in extent. Suppose we allow only forty trees per farm, we will have upon those farms 7,000,000 apple trees—I am speaking of apple trees in particular now. Then in addition there are about 110,000 families occupying lots below 10 acres in extent, and I think, taking these and the town and city lots into consideration, we can add on another million, making in all at least 8,000,000—and I am inclined to think that 10,000,000 would be nearer the exact figure. Now, supposing through the work of this association one cent can be added to the value of the product of every tree for a year, we would have added to the value of the apple product of this province from \$80,000 to \$100,000. "Oh, but," you say, "a cent an apple tree, that is nothing; why not talk about ten cents?" Well, then you are in the millions. Is there any man here having apple trees upon his farm or in his garden who has brought those trees to such perfection that he could not by a little more skill and a little more knowledge add ten cents at least to the value of the fruit annually produced upon them? If the lesson as to the value of spraying as taught by Mr. Craig's chart could be practised upon every farm and garden in this province, it would add not simply ten cents to the value of every tree, but an average of two or three and perhaps four times that amount. Now, this Fruit Growers' Association, with a small grant from the Government—some \$1,800 in cash, together with the printing of their report—have banded themselves together that they may bring up the general condition of this fruit growing industry. I have mentioned apples simply as one. We have all the other fruits; and if here and there by bringing the people together and dropping a little hint here and there, and by starting the people thinking and getting them to read their reports of the opinions they send out, they can get these men to slightly improve on their old methods, you can see

that the very small grant that the Government of the country makes to this Association would be returned not simply ten-fold but a hundred-fold, in fact, in the annual product from the fruits which are produced here year after year. But the audience to-night is made up principally of ladies. I presume that most of you have come from Orillia or its immediate vicinity, and you may say, "What has the Fruit Growers' Association to do for us?" The two very admirable, very carefully prepared and very able papers read to-night show that there is at least one line of this work that is of great interest to every woman in this land, namely, the cultivation of flowers. Now, some may say there is no money in flowers unless you raise them to sell. But there is money in having flowers in every home in this country; and, as has been emphasized two or three times to-night, there would be not only money in the farmer's pocket, but there would be increased interest in the farmer's work, and more boys staying on the farm if we could by means of flowers and other things make these places more attractive. Now, could not woman's sphere in town and village and farm life be somewhat enlarged? You go into a farm house to-day, and what is ordinarily the work of the woman of the house? In some places it is the old story, "Man works from sun to sun; woman's work is never done." But there are changes going on. The introduction of the cheese factory and the creamery is taking away from the women of the house a great deal of work that hitherto has been little short of downright drudgery, nothing else in fact; and I think that every effort should be made that possibly can be made to encourage the erection of these factories and creameries all over the country so that the women of the farm may be still further relieved of that hard and laborious work that would fall to their lot. (Hear, hear.) Is there nothing to take the place of that? Is there not in connection with the fruit growing, with the small kitchen garden, with the cultivation of flowers in and about the house, but especially in connection with the cultivation of small fruit out of doors, a work that appeals to the woman not only of the country but of the towns and villages who usually have at their disposal a small plot of ground attached to the house? There are several ways in which that can be made a benefit. In the first place there is the addition to the table; and I suppose if we can by any means increase the capabilities of the kitchen and the table, if we can add anything to the possibilities along that line, we shall certainly gladden the women's hearts, and I am quite certain we shall also gladden the men's hearts in this country. (Hear, hear.) There is thus supplied an additional amount of food for the table which is not only attractive in appearance, but at the same time is the most wholesome that can be placed there. There is the outdoor work which takes not only the woman but also the children out of doors day after day to give them out-of-door recreation and exercise which cannot be called hard work at all, but is more in the line of recreation or play. And so we might go on and instance many other things. Fruit growing on a small scale or on a large scale is one of the most civilizing influences that can be introduced in connection with the agriculture of this country. So that if we can do anything to encourage a farmer on his 200-acre farm, or the man on his small 50-acre lot, or the workingman on his small lot in the town or village, to set out a new bush or a new shrub or a new tree and add a little towards cultivating this and bringing a new productiveness and value to the place, I say that every man engaged in this work will be doing something that will not only be important to society as a whole, but will also be adding another blessing to the individual members of society. We might go on at greater length. I have simply touched upon these points because this seems to be more or less a ladies' meeting to-night. Two or three of us have been put in I suppose as a background for your addresses. It really is a ladies' meeting, and this is one point that should be brought home to the ladies, and if the ladies can be convinced in regard to this matter the whole question is finally settled. Now, there is this society in your midst, and I would like to simply suggest this, that from this town alone and this vicinity there ought to be added to the membership list of this society at least one hundred new members. (Hear, hear.) That would be very small, one dollar a piece; and what would be the effect? There would be brought back into this locality month by month the publications of this society, and year after year the annual reports going into a hundred homes to be read by several hundred people. One man would pick up one paper and get one idea, and another another; and one little point might repay ten-fold the small sum of \$1 which you invested at the beginning. I can emphasize this.

point, because I have no pecuniary interest. I am simply an unattached member of the society. This is a society that is doing a great good in this country. The fruit industry is going to be one of the great props upon which the farmers of this country must lean. The dairy industry is another prop. The old prop of grain growing has broken away under the farmers. The prop of live stock seems to have given way, though some think it will again brace up the farmer; but dairying and fruit growing seem to be the things upon which the farmers of this country are principally dependent; and when you go into the districts where fruit growing and dairying have been adopted as specialities, there you find less complaint about hard times and a more pleasant feeling pervading the general community; you find a little higher tone in the rural society—if you will understand that in the way in which I mean it—you will find there more contentment; and we can improve this as we can give an impetus to fruit growing as well as the dairying. The result will be that gradually we shall build up a more contented people not simply in our villages and towns, but also throughout the country; and I say that the hope of this country, the future of this country, is wrapped up in this one thing, in our having a happy, contented and prosperous community in our agricultural regions. (Applause.)

PRESIDENT RACE: The next item was to be an address by Mr. Morgan, of Barrie, but he is detained by professional duties. I would just say in relation to the address by Mr. James that our association does not devote itself entirely to fruit growing. We make an effort in the direction of floriculture and beautifying the home surroundings, tree planting, forestry and every thing of that kind. Personally I don't give as much attention to fruit growing as to floriculture. I cannot say to you "Come where the Lilies Bloom," but I can say to you "Come where the Roses Bloom." (Hear, hear.) I think I can say as an amateur I have the largest collection and variety of roses of any amateur in Ontario. (Applause.) I work among those roses myself; I know all about the work; and I may say there is nothing that will add so much to the pleasure and happiness of an individual as the cultivation of the beautiful in nature, and especially the rose. I am a lover of the rose, not because it is the emblem of my country, England, but for the influences it exerts upon myself, my family and the community round about. There is an influence in every rose and every flower. I do not think there is a gentleman in my town who receives so many pleasant calls from the fair ladies of the town as I do myself. (Hear, hear, and laughter.) I don't claim that there is any attraction in myself; but I can assure you that whenever there is going to be an entertainment or a social gathering in any part of the town, I have more ladies come to see me that particular afternoon than any other man in the town, because I have so many roses growing, and I take such a delight in giving them away, and I established a rule that I never give roses to any who didn't come themselves—so I insure very pleasant visits to my rosary; (laughter,) and I would recommend the good people of this town to give some time to the cultivation of roses. Christ said, "Consider the lilies." In doing so I believe that He gave as good direction to the people of that age as it was possible to give to any people, because the lily was an emblem of uprightness and purity, and of everything else that was good among the old Israelites. But you cannot give too much attention to the cultivation of all flowers. They have an ennobling influence. They appeal most directly to the finer influences and the very finest instincts of humanity. An American gentleman from Michigan visited our meeting in Hamilton, who told of having taken a drive through Ontario in order to learn for himself the character of the people. The Canadians who had emigrated to his state didn't impress him very highly. In his drive, his wife and daughter—about thirteen years of age accompanied him, and as they were passing through the district between Niagara and Hamilton, the young girl, after a long silence, during which she was viewing the beautiful scenery, suddenly exclaimed, "Papa, I know now why it is that all the people over here in Canada are such nice people, and that all the Canadians that we see over in Michigan were such a mean lot." On being asked for an explanation, she replied, "Well, papa, they have such a beautiful country over here that nobody but a mean man would leave this country and go to Michigan." (Laughter and applause.) Now, you don't want to have a higher compliment paid to your country than that; and we don't care how many mean men go to Michigan so long as we keep all the good people, such as we have met in Orillia.

Mr. BOULTER moved a vote of thanks to the orchestra, and all the kind friends who had provided the evening's entertainment.

Mr. CASTON seconded the motion, and spoke enthusiastically of the reception that had been accorded the members of the association on this visit. The motion was carried amid applause, and the meeting broke up at 10.30, after singing the National Anthem led by the quartette.

THIRD DAY—MORNING SESSION.

Mr. A. H. PETTIT read the treasurer's and auditors' reports, and said that the treasurer had also placed in the auditors' hands the balance as it is in the bank.

TREASURER'S REPORT FOR THE YEAR 1893-4.

Receipts.	\$ c.	Expenditures.	\$ c.
Balance on hand December 1st, 1893	148 21	Canadian Horticulturist	1,579 97
Members' fees	2,105 57	Salary of Secretary and Assistant	1,200 00
Government grant	1,800 00	Chromo Lithographs	246 90
Advertisements	241 28	Directors' expenses	200 60
Binding and bound volumes	44 20	Express and duty	182 33
Back numbers, etc.	16 47	Plant distribution	162 97
		Postage and telegrams	147 94
		Commission	124 48
		Committees	112 85
		Stenographer	88 50
		Book binding	50 03
		Printing and stationery	60 50
		Auditors	20 00
		Discounts	18 59
		Russian exchange	9 70
		Petty cash	7 50
		Care of rooms at meeting	2 00
		Balance on hand December 1st, 1894	140 87
	4,355 73		4,355 73

We beg to report that we have examined the books and vouchers and found them correct. Much credit is due for the precise and neat manner in which they have been kept.

W. W. HILBORN, }
A. H. PETTIT, } *Auditors.*

REPORT OF FINANCE COMMITTEE.

We the undersigned members of the Finance Committee would report that we have carefully examined the treasurer's accounts for the year and are pleased to find them in a satisfactory condition. Notwithstanding the general depression in business, our affairs have been so managed that we still have a balance to our credit of over one hundred dollars.

We recommend that hereafter in view of our limited resources that the expenses of the chairman of committees only shall have their expenses paid for attending the annual meetings to report, and said chairman shall only report at the request of the executive.

And we consider the thanks of the association are due to the secretary-treasurer for the faithful and economical manner in which the finances of the association have been managed.

A. M. SMITH,
A. H. PETTIT,
W. M. ORR.

The SECRETARY in answer to questions said that the total number of paid members now is 2,200.

The report was adopted on motion of Mr. COCKBURN, seconded by Mr. MORTON.

NOMINATING COMMITTEE.

The PRESIDENT nominated A. M. SMITH and Mr. McNEILL. The three members of the Committee nominated by the meeting were Mr. FISHER nominated by Mr. Smith; Mr. WELLINGTON nominated by Mr. Hillborn; and Mr. TOOL, of Orillia, nominated by Mr. Beall.

The Committee then retired to select the officers of the Association.

The Secretary presented the following report:

REPORT ON VARIETIES OF FRUITS DISTRIBUTED TO AND TESTED BY THE MEMBERS OF THE ONTARIO FRUIT GROWERS' ASSOCIATION.

Since the year 1875, plants and trees have been annually distributed among the members for the express purpose of ascertaining their adaptability to the various sections of our province.

Reports concerning these have from time to time appeared in the *Canadian Horticulturist*, but it is only after many years that the real value of new varieties can be definitely ascertained.

The following report will give some idea to the public of the real value of the varieties thus far distributed. The date given after the name, is the year distributed by the Fruit Growers' Association of Ontario.

APPLES.

1. The *Swazie Pomme Grise*, (1875). A small, round, russett apple, for dessert purposes; season, December to April; quality best, but tree not productive enough to grow for profit. Mr. Thos. Beall, of Lindsay, Ont., writes in 1892, "My tree is alive yet. I get a few apples from it every year. It is not sufficiently hardy, and cannot be recommended for cultivation in this district. An unprofitable variety."

The *Wealthy*, (1882). A native of Minnesota. Tree hardy, vigorous and productive. Fruit, medium, regular, red streaked with white; season, September to April. The tree begins to bear young, and produces annual crops. Of great value everywhere, but especially at the north where it is a winter apple. A. Hood, of Barrie, has kept it until June. It will perhaps replace Fameuse in time. Mr. A. A. Wright, of Renfrew, says that the *Wealthy* is among the hardiest and most desirable kinds to plant in the cold north. The thermometer with him frequently sinks to 40° below zero, and yet he grows the *Wealthy* with great success, and advises planters in that climate to set any number of trees of this variety.

The *Ontario*, (1879). A fine large, round oblate apple, yellowish red in color, of good quality, suitable for both kitchen and market; keeps until May. A report from Victoria county says, "Young trees of this variety are doing very well, and scions grafted on Talman Sweet and on Tetofsky have made wonderful growth for several years, and are bearing well. The color of the skin when mature is a bright golden yellow, shaded and overlaid to the extent of about one-half with the most brilliant carmine. It is, probably, one of the best of apples in quality, and certainly the most profitable winter apple grown in Central Ontario, but reports show that it has not proved sufficiently hardy in the vicinity of Ottawa." A Nova Scotia report says; "This apple succeeds admirably here. The tree is hardy, a vigorous grower, and an early bearer. The quality is ordinary,

but the tree is enormously productive of large, long keeping apples." Mr. E. B. Edwards, Peterboro', writes: In the annual report for 1893, at page 59, I am credited with having made some statements as to this apple, which, according to my recollection, were not made by me, but by Mr. Beall, of Lindsay, who has had more experience with this tree than I have had. Before seeing the annual report—it only came to hand to-day—I was about to write to ask you or your correspondents whether the Ontario is or is not a hardy tree. My experience is very limited, but it points to the fact that the tree is not hardy, and that it is not a clean, healthy growing tree. Out of 100 standard trees of this variety planted two years ago, 25 have failed, having apparently been frozen after having made a fair start, and the stems of a number of others are scraggy and rough, indicating anything but a healthy growth. Of 60 small trees—one year old—which I set out a year ago, 8 failed altogether, and 17 others have apparently been frozen down to the snow line during the past winter. I have thus only a little over one-half of the 60 trees left in a healthy condition. My losses with other trees, some of them planted three years ago, some of them last year, and including plums and cherries, as well as apples, have not exceeded four per cent. Raised by the late Charles Arnold, of Paris. Northern Spy x Wagener

The *Canada Baldwin* (1884): The late Rev. Robert Burnet was quite an ardent advocate of this apple. He considered it a first rate dessert fruit and a good keeper, and stated in his report that the tree is very prolific. He said, "I think that when better known it will become a favorite market apple, as its color is a point in its favor, being showy and attractive." Possibly it may be more desirable for northern sections where larger but less hardy varieties cannot be grown, as it is not a large apple, and most growers of apples for profit find this to be an important characteristic.

The *Yellow Transparent* (1886): A valuable early variety. Not subject to scab. Larger than Early Harvest. Almost white when fully ripe. Ripens with Early Harvest, but hangs much longer on the tree.

The *Princess Louise* (1889): Not yet fully tested. The quality is excellent for dessert purposes; larger than Fameuse which it resembles in flavor. It has a beautiful red cheek when fully colored, and is very attractive. Its season is December to February.

APRICOTS.

The *Russian Apricot* (1890): Blooms too early, and is subject to curculio; therefore unproductive.

CHERRIES.

The *Vladimir* (1887): A small, oblate, dark red cherry imported by the late Charles Gibb from Russia for trial at the north, but proved to be of little value for Ontario. Badly affected with curculio. Mr. A. A. Wright, of Renfrew, says, "The Vladimir has been growing on my ground for four years and appears, as yet, to be quite hardy. It has a low growing bushy habit and the indications are that it will be iron-clad enough for our inclement weather. Unfortunately the fruit is not as good as we would like, but will do where we can get no better."

The *Ostheim* (1888): Like Vladimir, of little or no value in Ontario.

CURRANTS.

Lee's Prolific Black (1882): Probably no improvement on Black Naples. Very large; bunch medium; color black. A poor bearer.

Fai's Prolific (1885): A large, red currant; ripens in July. Quality very good. Very valuable everywhere.

DEWBERRIES.

The *Lucretia* (1886): Valuable where winter protection is needed, because of its trailing habit. Of little value where the finer varieties of blackberries can be grown.

GRAPES.

The *Burnet* (1878): Medium size, oval, black grape, of good quality for table; too late in ripening for all the northern parts of Ontario. The vine is vigorous and hardy. Raised by the late P. C. Dempsey, Trenton, Ont. Hartford Black Hamburg.

The *Senasqua* (1881), Bunch large, berry medium; a round, black grape of very good quality for dessert. The vine is vigorous, productive and hardy. Not reliable.

The *Moore's Early* (1882): A large, round, black grape of good quality. Ripens early in September. Succeeds at the north. Moderately productive. Mr. W. M. Patterson, of Clarenceville, Que., says of this grape that, though good in quality, it proves in that province unproductive and slow growing variety.

The *Worden* (1883): A large, round, black grape of good quality; ripens soon after Moore's Early, and is more productive. It resembles Concord, but ripens about ten days sooner. Mr. W. M. Patterson, of Clarenceville, Que., says that he thinks this grape must take the place of Concord in the province of Quebec where it is much appreciated for home use and for market.

The *Prentiss* (1884): A medium sized, round, greenish grape of good quality. Hardy. Unprofitable.

The *Early Victor* (1886): A good grape, but not sufficiently productive. A small, early, black grape of good quality. Mr. W. M. Patterson, of Clarenceville, Que., says of this grape that it cannot be classed as an early, but only as a medium early variety. Its maturity in a great measure depends upon the removal of a good proportion of its clusters soon after they are formed. It is a good grape for home use, for table or for wine.

The *Niagara* (1888): Proved to be equal to all its introducers said of it. The most profitable white grape in central or southern Ontario. An immense bearer.

The *Vergennes* (1889): A valuable red grape in southern Ontario. The quality is good and it is one of the best keepers we have. Rather late for central and northern Ontario.

The *Mills* (1891); A beautiful grape, but our season is not long enough for it. Chas. Hunter, of Niagara, says he grew it on heavy clay soil. The berries were large and black; the clusters very large and heavily shouldered. The vine a heavy bearer and quite hardy there. Ripened about the first week in October, and was then the best late black grape. The only objection is its thick skin.

PEARS.

The *Goodale* (1877): A large, yellowish green pear of good quality. Season, October to December. It did not succeed in the north.

PLUMS.

The *Glass Seedling* (1876): A large, black, oval plum of good quality, ripening in August. Mr. Beall, of Lindsay, wrote of it in 1892, "Tree hardy, moderately productive, and fruit of attractive appearance, which, although only second rate in quality, commands first price in market. Can be profitably grown."

Prunus Simoni (1890): Quite ornamental in fruit, but not good for anything else but ornament.

RASPBERRIES.

The *Saunders* (1880): A hybrid between Philadelphia and Mammoth cluster. Originator, Wm. Saunders, then of London, Ont. Few reports. A medium sized, purple berry of good quality. Not recommended for profit. Was quite hardy in central Ontario and very prolific, but the peculiar color of the fruit made it entirely unsalable. Its cultivation, therefore, had to be abandoned.

The *Niagara* (1883): No report.

The *Marlboro* (1886): Large berry of fine color and, therefore, quite salable. It is quite early in ripening, but the canes are not vigorous, and it is not very productive. Somewhat tender at the north.

The *Hillborn* (1887): About the size of Gregg. It is hardy, vigorous and productive and the fruit of excellent quality. An accidental seedling introduced by Mr. W. W. Hilborn, then of Arkona, Ont.

The *Golden Queen* (1888): A sport of the Cuthbert, but scarcely as productive, and not as valuable for market. Originated in New Jersey.

The *Shaffer* (1890): A fine, vigorous grower and very productive. Its dull red color makes it less profitable than other varieties, but for home use it is unexcelled. A chance seedling and originated with Geo. Shaffer, Monroe Co., N. Y. Introduced by Chas. Green of Rochester, N. Y., 1878.

STRAWBERRIES.

The *Ontario* (1886): Of little value.

The *Jessie* (1889): A very large, showy strawberry, but not sufficiently productive to be profitable.

The *Bubach No. 5* (1890): One of the best varieties that we have at the present time; it is both large and productive.

The *Williams* (1891): A fine, large berry, very productive and profitable in some parts, on sandy soil, but on other parts reported on unfavorably.

In addition to the above the following have been distributed, but it is yet too soon to report upon them:

In 1891 Triomphe de Vienne pear; in 1892 Moore's Diamond grape, Idaho pear, Gipsy Girl apple, Round Borsdorfer apple, Blushed Calville apple, Silken Leaf apple, Little Hat apple; in 1893 Seedling black currant, Red Queen apple, Golden Reinette apple and Crimean apple.

The testing of new varieties may in future be best done by our fruit experiment stations. The Fruit Growers' Association will be able to work in harmony with these stations; and when any new varieties of fruits have been proved worthy of introduction, we hope to be able to distribute them among our members, and thus benefit the fruit industry of our country.

In the spring of 1894 we distributed the following list of plants which were furnished us gratuitously by the Central Experimental Farm, Ottawa. With the list we also publish the descriptions of the same as given us by Prof. John Craig:

Acer Ginnala, Ginnalian maple.—This was first introduced from the Amur River region in Asia, by Dr. Regel, the eminent Russian botanist. Prof. Budd, of Ames, Ia., and the late Charles Gibb, of Abbotsford, Que., were instrumental in bringing it to America; and the plants which are this year being distributed to the fruit growers are raised partly from seed grown at Ames, Iowa, and at the Experimental Farm at Ottawa. Nicholson says, "The tree is generally classed as a variety of *Acer tartaricum*, but its habit is more graceful, and in this form the leaves are prettily cut and lobed, whilst the leaf-stalks and mid rib are more deeply colored." It never attains large size, and should be ranked among the arborescent shrubs in this respect. In the early autumn it is a thing of beauty upon the lawn—resplendent in a dress of bright crimson—it glows like a ball of fire, and warms the whole landscape. Another characteristic much appreciated in the north is its extreme hardiness. At Brandon, Man., and Indian Head, N.W.T., it has been reliable so far.

Caragana Arborescens, Siberian Pea Tree, as the name indicates, is a native of Siberia, and belongs to the pea family. It grows 15 to 20 feet high, and is very ornamental in early spring by reason of its light green, feathery blossoms. These are succeeded later by small pods enclosing the seeds, which may be sown as soon as ripe or kept till the following spring. They germinate very readily. Some 10,000 were grown

here last year in two beds 4x10 feet long. Like the maple, this is extremely hardy. I have been recently informed that hedges of this tree have been grown by settlers of the Mennonite districts, in Manitoba, which proves the assertion in regard to its hardiness.

Elaeagnus angustifolia, Wild olive.—This was, I believe, introduced from East Europe by Prof. Sargent, of the Arnold Arboretum, as well as Prof. Budd, of Ames. It is closely related and resembles in many respects our Western Buffalo Berry (*Shepherdia argentea*), but is much more silvery in leaf and twig. It grows rapidly, but does not attain large size. The flowers are inconspicuous, appear in early spring, and are extremely fragrant. From the name wild olive, people are occasionally led to believe that it is a fruit-bearing plant, which is quite inaccurate, as the fruit is entirely inedible. This is a very desirable bush for shrubberies.

Prunus pumila, Sand Cherry.—This plant is found growing wild in various portions of Western Canada and the United States, and being widely distributed, varies much in quality of fruit and character of growth. Its normal form is prostrate and depressed. In Nebraska it has been cultivated by early settlers for a number of years, and improved varieties will undoubtedly appear under cultivation before long. One is already being offered for sale under the name of Dwarf Rocky Mountain Cherry. This is claimed to be a special form native to certain regions of the Colorado Rockies. The fruit of the type is smaller than the Morello cherry, is nearly black when ripe, with a small proportion of pulp to pit. As a fruit plant it will be useful where the Morellos cannot be grown. It may be of much value as a dwarfing stock both for plum and cherry, and this phase is now under experiment. As a plant of possible value, and as a botanical curiosity, it is decidedly interesting.

The following description of the Sarah raspberry appeared in the Horticulturist's report for 1893 :

Sarah (Record number 4-38.).—Produced in London, Ont., by Prof. Saunders, from seed of Shaffer's Colossal. Plant a moderate grower, suckering freely, and propagating naturally only in this way. The foliage seems to be intermediate between the European raspberry, *Rubus Ideus*, and the American, *Rubus Strigosus*. The canes have been affected to some extent by anthracnose, but not more than Cuthbert or Marlboro growing alongside. Fruit large, round; drupes large, deep garnet, firm, very juicy, pleasantly acid and exceptionally rich. A few ripe berries were found last year, and this year, at the time of the first picking of Cuthbert, but the main crop did not ripen till the season of Outhbert was over, the last picking taking place each year from the 8th to 12th August.

A striking characteristic of this variety is its habit of ripening the fruit in consecutive order and much regularity, beginning with the terminal clusters of each branch. Of course this is in a measure true of all red raspberries, but none that I know of carry the peculiarity to the same extent.

In addition to these about two hundred each of the Pearl gooseberry and Green Mountain grape were sent out, besides one hundred Smith's raspberry, one hundred Moyer grapes, one hundred McIntosh Red apple, and several varieties of strawberries, in all about nineteen hundred packages.

For distribution in the spring of 1895 we have received from Mr. Wm. Saunders, Director of the Central Experimental Farm, the following plants :

- 500 *Rosa rubifolia*.
- 200 *Cotoneaster vulgaris*.
- 150 Douglas spruce.
- 150 *Pinus ponderosa*.
- 200 Sarah Raspberry.

In addition to these we propose sending out a few hundred more of the Pearl gooseberry and the Green Mountain grape.

All of which is respectfully submitted.

L. WOOLVERTON,
Secretary.

The SECRETARY proposed that a committee of one or three be appointed to look over this paper before its publication, and suggest any changes in the descriptions or reports of the various plants that have been sent out.

Mr. ROBSON (Lindsay): The Ontario apple grew a few years and then died. I think it will do best when grafted on some hardy variety.

Mr. MORTON: This report will be published, and if there are no limitations mentioned it will go out as the result of the Association's work.

Mr. PETTIT: I do not see why the Association should take any special action on that report. We sent out those fruits to be tried. We have now got the reports of those gentlemen as they appeared from time to time in the *Horticulturist*. Each gentleman's report is given. It is not necessary for us as a body to endorse any such report. I think the time is coming when we will get this thing a little more condensed than we have it, that is, that our experimenters will bring in a report on fruit adapted to that particular section.

The PRESIDENT: From whom does this report come?

Mr. MORTON: From Mr. Woolverton (who had retired meantime with the nominating committee). He mentioned to me that he would be glad that it should be looked over by individuals or others, and such things as thought well incorporated in it. It is by him, but it is sort of semi-official; it is by him as secretary.

Mr. M. PETTIT moved that this report be referred to a committee consisting of Messrs. Morton, Beall and Morris, to go over it and recommend what they see fit—whether it be published or changed or whatever they think best.

Prof. CRAIG suggested that Mr. White's name be put on as he is from that district. Messrs. MORTON, BEALL and WHITE were therefore named as the committee.

REPORT OF COMMITTEE ON EXPERIMENTAL STATIONS.

Prof. CRAIG read the report of the committee for drafting a scheme for experimental stations. This report was adopted as follows:

Mr. Chairman,—Your committee, appointed at the last meeting of the association, held at Peterboro', in December, 1893, for the purpose of drafting a scheme for the then proposed system of experimental stations, beg to report briefly as follows:

It was found impossible, within the limits of the time at our disposal at Peterboro', to formulate a satisfactory plan; this fact we reported to the association, with the result that we were continued, with instructions to co-operate with the executive of the association. After considerable deliberation and correspondence a plan of action and basis for the foundation of an extended system of experimental stations was outlined. The main features of the scheme were: 1. To multiply the stations as much as possible, in order to increase to a maximum our knowledge of the behaviour of the same plant under varying conditions of soil and climate. 2. To secure to the association the valuable knowledge gained by individual experimenters, who from personal inclination have become specialists in certain lines of fruit culture. It was believed that by keeping these two thoughts in mind that a maximum of profit could be attained with a minimum expenditure.

You are all aware that this report has been received by the executive of the association and acted upon by the Department of Agriculture in conjunction with this body.

It is a matter of considerable gratification to your committee that the initial steps in this important work have been so promptly taken, and with the hope that it will prove as successful as our warmest wishes desire, we now respectfully ask that this brief report be accepted and that this committee be discharged.

JOHN CRAIG,
A. MCNEILL,
W. W. HILBORN. } Committee.

NEW FRUITS EXAMINED, 1894.

Mr. D. W. BEADLE read the report of the committee on new fruits respecting such fruits as were examined during this year.

STRAWBERRIES.

John D. Roberts, Cobourg, Ont., sent to Mr. Beadle a strawberry basket filled to the brim with very large strawberries, the whole number of berries being seventeen. Mr. Roberts wrote, under date of June 26, 1894, thus: "With many other trees, shrubs, etc., I have imported from France and England four varieties of strawberries. The best I have is Laxton's Noble; the birds are eating so many that I have sent some unripe." The berries arrived in good order during Mr. Beadle's absence from home, so that only one remained in condition to be examined on the 30th June, when he returned. This probably was one of the "unripe" berries. Mr. Beadle reports that this was a very large berry, of a rich, deep red color, in form regular rounded conical, flesh firm, red throughout, juicy, in flavor vinous, with considerable strawberry aroma, and that his family unanimously declare that the berries, which they considerably ate to keep from spoiling, were delicious.

GOOSEBERRIES.

John Carnie, Paris, Ont., sent a package of gooseberries, which were received by Mr. Beadle July 19, 1894, and which he describes as follows, viz.: color, yellowish green, veining of a lighter shade and very distinct; form, varying from long to roundish oval; size, above medium to small; measurements, length $\frac{3}{4}$ in. to $1\frac{1}{4}$ in.; circumference $2\frac{5}{8}$ in. to $3\frac{1}{8}$ in.; skin, thick and tough; flavor, acid; apparently the fruit was unripe. Mr. Carnie writes that this is the 21st crop borne by a plant gotten from the north of Scotland in the spring of 1871, which has never been affected with mildew, though surrounded by another kind covered with it. Growing in a dry, gravelly soil, Mr. Allan says, "it is, in my opinion, not a new seedling but an old variety which has been introduced under various names. Is it not Gascon? If so, it is peculiar in its tendency to drop its leaves early. The same berry has been sold as Barber's Best, Valentine, and some other names. As I find it, rather imperfect as it reached me, quality not first class, and in any case only useful for cooking." Where Whitesmith and Industry can be grown, it is the opinion of the committee that this variety cannot be considered valuable.

PLUMS.

Keep Brothers, Winona, Ont.; received August 24th, 1894. Three specimens. Color, marbled red on a light yellow ground; form, egg-shape; length, $1\frac{1}{2}$ to $1\frac{5}{8}$ in.; circumference, $4\frac{1}{8}$ to $4\frac{3}{8}$ in.; suture distinct from stem to apex; stem, $\frac{1}{2}$ in. long, slender, curved, inserted in a very slight cavity; flesh, yellow, coarse; acid, not rich; seemingly not fully ripe; stone, cling, oval, tapering to a point at upper end, 1 in. long by $\frac{1}{2}$ in. broad, sides moderately swollen, covered with numerous small depressions, deep suture on one edge, three ridges on the other, the centre ridge highest, with an almost dentate crest. Fruit resembles the Red Egg, but smaller, with no points of improvement over that variety.

Richard Trotter, Owen Sound, Ont.; received August 25, 1894. Color, light greenish yellow, with a few broken stripes of deeper shade; form, unsymmetrical egg-shape; length, $2\frac{1}{8}$ in.; circumference 6 in.; suture, a mere line from stem to apex; stem, $\frac{3}{4}$ in. long, moderately stout, slightly curved, inserted in a small shallow cavity and terminating in a knob; flesh, light yellow, firm, juicy, fibrous, sub-acid, perhaps not fully ripe; stone, partially a cling, oval, thick, broad at one edge, having three prominent ridges, one of which projects into a point, the other end sharp and without suture; surface rough. This gives promise of being a valuable fruit, having, when fully ripe, a rich vinous flavor, with quality very good. The above description is made from a single

specimen, the only one received by the writer. Mr. Allan says that the specimen received by him showed, indistinctly, appearances of mottled blush on sunny cheek; flesh, green with a strong tinge of yellow, a little coarse, slightly acid but pleasant, and designates it a freestone. He considers it first class for cooking, and a good shipper, and remarks that it is too valuable to be lost sight of.

Mr. Trotter has named it Lillian Augusta, and says that the tree is hardy and a good bearer.

W. H. Snelling, Ottawa, Ont., wild plum (*P. Hortulana*), August 25, 1894. Five specimens; color, marbled red on a yellow ground; form, nearly round, like a marble; length, $1\frac{1}{4}$ in.; circumference, $4\frac{1}{4}$ in.; suture, merely a line; stem, 1 in. long, somewhat curved, inserted in a very slight depression; flesh, yellow, soft, juicy, vinous, very good; stone, partial cling, flat, nearly circular, surface rough, ridges not prominent; skin, very thin and tender, with some astringency. This is one of the best of its class that we have seen; will surely be esteemed where only our native varieties endure the climate.

Mr. Allan says of this variety that it has a richness of flavor that would render it most desirable for cooking, and is of larger size and better flavor than most of our wild plums.

Tree received by Mr. W. H. Snelling, New Edinburg, Ont., from Gatineau Point, Indiana, is now 14 years of age. Has proved an annual bearer. Thus far it has not been affected by rot or the spot disease.

Thomas Holloway, Clinton, Ont., August 31, 1894. Three specimens. Tree has heavy foliage, is a great bearer, five or six years in bearing; is trained on east wall of the house; fruit, medium, $1\frac{3}{8}$ in. long to $1\frac{5}{8}$ in.; circumference $4\frac{1}{2}$ in. to 5 in.; form, roundish oblong; suture, but a line, nearly obliterated in some; skin, yellow, very thickly sprinkled with white dots, occasional light brown specks, and a very thin white bloom, tough, but thin; stalk, medium to slender, $\frac{1}{2}$ in. long, straight; cavity small, deep, clasping the stem by a fleshy ring at insertion; flesh, yellow, juicy, a little coarse, rich vinous flavor, very good; stone, cling, oval, thick, with suture the whole length of the sharp edge, and three strong ridges the entire length of the opposite edge. These plums exhale a rich fruity odor, and are esteemed by Mrs. Holloway as better for preserving than any of the other many varieties grown by Mr. Holloway.

Mr. Allan says of this: "I remark its beauty, the small pit for a seedling, and good quality as a cooker, and that it is worthy of cultivation." He adds that he knows Mr. Holloway to be a reliable man.

R. C. Bradshaw, Thornhill, Manitoba, September 3rd, 1894. Five specimens wild plums, color red, some very dark red, very thickly sprinkled with exceedingly minute dots; skin very thick; size, small, $1\frac{1}{4}$ to 1 in. long; circumference, $3\frac{5}{8}$ to $3\frac{1}{4}$ in.; form, round; suture, a mere line; stalk, $\frac{1}{4}$ in. long, curved; cavity only a depression; flesh, yellow, very juicy, nothing but a watery pulp permeated by tough fibre, sweet, but without other flavor; quality, poor; stone, free, round, thick; no suture on the thin edge, opposite edge marked by raised line on each side; length and breadth about equal.

Mr. Allan says: "No doubt valuable there where hardiness is a requisite, as it is a really fleshy, good preserving plum, though not high flavored." Recommended for trial only in Manitoba and the Territories.

John Wood, Monticello, Wellington County, Ont., September 8th, 1894. Ten specimens, of which five were forwarded to Mr. Oraig. Fruit, medium to small, $1\frac{1}{4}$ to $1\frac{3}{8}$ in. long; circumference, $3\frac{5}{8}$ to $4\frac{1}{4}$ in.; form, round ovate; suture, obliterated; skin, dark purple, almost black in the sun, thickly dotted all over with minute grey specks and covered with a very thin white bloom; stalk short, moderately stout, usually somewhat curved; cavity, round, smooth, of moderate depth; flesh, greenish, firm, not juicy, yet not dry, sub-acid, flavor as if unripe; stone, free; $\frac{3}{4}$ in. long by $\frac{1}{2}$ in. wide, tapering at the upper end, suture deep and narrow; opposite edge sharp, flanked on both sides by a ridge, surface of sides smooth, but uneven and swollen.

Evidently one of the Damson type, but not sufficiently marked in regard to quality to entitle it to a commendation.

Richard Trotter, Owen Sound, September 11th, 1894. Suggests for name, "John A." One specimen; fruit large, $1\frac{7}{8}$ in. long; circumference, $4\frac{3}{4}$ in.; form, long oval;

suture, just a line from stem to apex; skin, a dark purple in the sun, reddish in the shade, thickly sprinkled with minute grey specks, specially on the upper half, covered with a thin blue bloom, and both thick and tough; stalk, straight, moderately stout, $1\frac{1}{4}$ in. long; cavity, broad, round, shallow, with a fleshy ring which adheres to the stem at the point of insertion; flesh, very light yellow, moderately juicy, vinous, flavor agreeable, good; stone, partially clinging, oval, bluntly tapering at the upper end, deeply sutured, opposite edge carinate, flanked on each side by a continuous ridge; surface of the sides somewhat roughened; $1\frac{1}{8}$ in. long by $\frac{3}{4}$ in. broad.

Mr. Allan says: "I consider it worthy of further test, as it is good in quality, having that of a fine cooker, and should be valuable for market."

Produced by pollenizing a local seedling named Evelyn with Fellenberg. Tree said by Mr. T. to be healthy, a rapid, strong grower with heavy foliage. Has borne for two years only. Fruit hangs well to the tree and keeps well after being gathered. Twelve specimens weighed $1\frac{1}{4}$ lbs. Commended for cultivation.

Daniel H. Hoover, Almira, September 11th, 1894. Seven specimens. No. 1. "Tree about seventeen years old; grafted near the ground on a common blue plum. The graft received from a friend in Pennsylvania who could not give any name. Tree is iron clad and nearly black knot proof, bears regularly, generally ripening after the middle of September, but earlier this year owing to drouth and heat." Such is Mr. Hoover's account of the tree, which he thinks a seedling. With the fruit he sent three leaves from the tree. The leaves are ovate, the two smaller taper at both ends, the largest tapers towards the apex and is rounded towards the petiole; all are coarsely and irregularly serrate; petioles delicately pubescent, moderately stout, an inch long; upper surface dark green and glossy, under side pale green and covered with a delicate white pubescence specially noticeable on the veining, midrib prominent with three quite strong branches from each side, size varying from $3\frac{3}{8}$ to $3\frac{3}{8}$ in. long by $2\frac{1}{4}$ to $1\frac{3}{4}$ in. broad; fruit, above medium, $1\frac{1}{2}$ to $1\frac{5}{8}$ in. long; circumference, $4\frac{1}{2}$ to 5 in.; form, ovate, flattened at both ends, most so at stem end; suture, a line from stem to apex with scarcely any depression; apex marked by a dot slightly raised above the surface; stem, thick, dark purplish red on the exposed side, bright red in the shade, and thickly sprinkled all over with small gray specks, the whole overspread with a blue bloom; stalk, $\frac{3}{4}$ to 1 in. long, slender, curved at the extremity, surrounded at its insertion by a fleshy ring that adheres to the stalk; cavity, deep, smooth, ranging from ovate to almost round, situate in a shallow depression; flesh, yellow, firm, mealy, moderately juicy, rich vinous flavor, separating freely from the skin; stone, small, $\frac{3}{4}$ in. long by $\frac{5}{8}$ in. wide, deep suture down one edge, the other carinate flanked by moderate crests, outline oval, drawn to a truncated point at upper end, almost free, clinging but slightly at the edges, surface of sides almost smooth.

The color of this plum has a marked resemblance to that of Reine Claude Violette, which is the Purple Gage of Downing.

Mr. Allan thinks this possible seedling worthy of further investigation and report.

Mr. Craig is of the opinion that it is a European variety of which the name has been lost. He was unable to identify it. Worthy of further investigation.

D. B. Hoover, Almira, September 11th, 1894. One specimen of No. 2. Fruit small; round ovate; $1\frac{1}{8}$ in. long; circumference, 4 in.; suture, a line without any depression; apex marked with a dot; skin, thin, light red in the shade, dark red in the sun, numerous specks scarcely visible scattered over the whole surface; no bloom on this sample; stalk, $\frac{5}{8}$ in. long, curved, slender, a small ring at its insertion in a cavity large and deep for the size of the plum; flesh, light yellow, firm, mealy, not juicy, sub-acid, not rich, separates from the skin like a boiled potato; stone, free, thick, oval, about equally pointed at both ends, one edge distinctly sutured, the other carinate flanked with but slight ridges, surface of sides rough; $\frac{3}{4}$ in. long by $\frac{5}{8}$ in. wide; much inferior in quality to No. 1.

Mr. Allan says smaller and not so valuable as No. 1, and the committee do not think it worthy of commendation.

D. B. Hoover, Almira, September 19th, 1894. Five specimens; three leaves accompanied the fruit, which were broad ovate tapering abruptly to a point, and gradually towards the petiole, edges coarsely serrate, midrib prominent with less prominent branch-

ing veins, surface smooth and dark green, underside wooly. Fruit medium, $1\frac{3}{8}$ in. long, circumference, $4\frac{5}{8}$ in., usually flattened at the stem end; skin, thin, red to dark red, thickly sprinkled with exceedingly minute dots and overspread with a blue bloom; stalk, from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. long, moderately stout, straight, inserted in a broad shallow cavity; suture, a mere line in a very slight depression; apex marked by a slightly elevated dot; flesh, yellow, mealy, not juicy, moderately rich, blended vinous and sugary; flavor pleasant, quality good, separates freely from the stone, which is nearly round, thick; sutured on the thin edge, the other edge carinate with a strongly projecting keel, length and breadth about equal, $\frac{5}{8}$ in.

Not superior or even equal to other named varieties of the same season.

Experimental Farm, Ottawa, September 19th, 1894. Russian plum, "Moldavka." Fruit large, oval, flattened at stem end; $1\frac{1}{2}$ in. long; circumference, $4\frac{7}{8}$ in.; suture, a very slight, broad depression running from stem to apex; skin, thick, very dark purple, almost black, marked with a few irregular russet patches of varying sizes, and a few russet dots, the whole covered with a blue bloom; stalk, $\frac{1}{2}$ in. long, moderately stout, with a fleshy adhering ring at the point of insertion; cavity large, round and deep; apex marked by a large round russet dot; flesh, yellow, firm, mealy, not juicy, sub acid, rich with a peculiar disagreeable medicinal flavor; adhering to the stone, which is oval, tapering to a point at the upper end, a deep suture in the sharp edge, the other broadly carinate, the sides swollen, length almost 1 in., breadth $\frac{5}{8}$ in.

Only one specimen received. Season, September 1 to 6. Specimen examined had been kept in a cellar for nearly three weeks and flavor may have been affected thereby. Tree hardy and vigorous at Ottawa.

Mr. Craig is of the opinion that this would be valuable for cold climates.

Experimental Farm, Ottawa, September 19th, 1894. Russian "Early Red." One specimen; fruit, medium, round, oval; $1\frac{1}{2}$ in. long; circumference, $4\frac{3}{8}$ in.; suture, a line from stem to apex, with scarcely any appreciable depression; skin, thick, reddish purple, thickly sprinkled with round russet dots, overspread with a blue bloom; stalk, $\frac{1}{2}$ in. long, moderately stout, curved, growing gradually stouter to its insertion in a small, round, shallow cavity, where the skin adheres to the stem; apex indicated by a small russet dot; flesh, yellow, firm, mealy, not juicy, sub-acid, rich, with an agreeable flavor; adheres strongly to the stone, which is long oval, tapering towards both ends, the sharper edge sutured, the other abruptly ridged on one side giving the edge the appearance of being creased, sides swollen and rough, length 1 in., breadth, a little more than $\frac{1}{2}$ in.

Tree a round topped moderately vigorous grower, thus far a light annual bearer. Promising when other varieties of *prunus domestica* fail.

PEACHES.

J. C. Davis, Freeman, Halton County, September 7th, 1894. One specimen; fruit large; $2\frac{1}{4}$ in. long; circumference, $7\frac{3}{8}$ in.; round, ovate, somewhat flattened on both sides; suture, shallow, well marked at both ends, though barely visible at the centre, and extending beyond the apex, which is slightly sunken; skin, yellow, marbled with purplish red in the sun; flesh, yellow, not red next to the stone, save a red line opposite the suture, juicy, melting, vinous, almost sub-acid, not high flavored, quality not above good, separates freely from the stone, which is large, $1\frac{3}{8}$ in. long by $1\frac{1}{4}$ wide.

This seedling was found by Mr. Davis in an unused raspberry patch, and has borne two years.

Mr. Craig thinks it compares this season very favorably with Early Crawford in size, appearance and quality.

APPLES.

Thos. W. Letts, Calumet Island, Que.; latitude 45° north; August 24th, 1894. Two specimens received. Size, large, $2\frac{1}{4}$ in. long; circumference $8\frac{3}{4}$ in.; skin, light yellow, marbled with bright red in the sun, and thickly sprinkled with small irregular-shaped russet dots; calyx open, segments erect, short and pointed; basin small, $\frac{3}{4}$ in. broad,

smooth; stem, stout, straight, $\frac{5}{8}$ in. long; cavity deep, narrow, russeted; flesh white, not fine grained, granular, dry and moderately sweet; core large; quality barely good, quite below that of Sweet Bough.

Mr. Allan says it may be of some value where grown, but has nothing to recommend it for general use; flavor an insipid sweet; traces of dry rot under the skin. Not commended.

C. J. Willson, Greenwood, Ontario Co. August 27th, 1894. Six specimens. Tree four years old, growing in hard clay soil on a side hill; fruit small to medium, 2 to $2\frac{1}{8}$ in. long; circumference $7\frac{1}{2}$ to $9\frac{1}{4}$ in.; round to roundish oblong, obscurely ribbed in the larger specimens; skin, light yellow, nearly white, sprinkled with minute light colored dots, oily; stalk, $\frac{5}{8}$ in. long, slender and straight; cavity, deep and lightly russeted; calyx, closed, segments long and foliaceous; basin shallow, slightly corrugated; flesh, white, grain of medium fineness; juicy, acid, not rich; core, medium; soon shows symptoms of decay; not of sufficient quality to merit dissemination.

C. F. Honner, Amherstburg, Ont., October 10th, 1894. Two specimens. Tree planted by some original settler of that district; fruit medium, round, flattened at both ends; about $1\frac{1}{2}$ in. long; circumference, 8 to $8\frac{1}{4}$ in.; skin, red, light green on shaded part, sprinkled especially towards the blossom end with small white dots, in the centre of which is a russet speck, long oval in outline, often appearing as if the skin were cracked in the direction of the long diameter; stem, stout, about $\frac{1}{2}$ in. long, set in a deep, smooth, round, russeted cavity; calyx, closed; basin, moderately deep, broad and corrugated; flesh, white, fine grained, somewhat tough, not juicy, sweet and rich, quality very good; core medium.

Mr. Allan says: "It may be a seedling, but so close to Bailey Sweet that it can hardly be distinguished from it. I think it is Bailey Sweet." Mr. Craig says that this apple is the exact type of Dery's Baldwin, described last year. It is pronouncedly sweet; shows some signs of apple scab; as a sweet baking apple it may have value.

The following varieties were received from the Experimental Farm, Ottawa, and examined October 23rd, 1894:

Gideon, Minnesota, by Peter M. Gideon, Fruit large, $2\frac{3}{4}$ in. long; circumference, 10 in.; conical to oblate; skin, yellow, a light blush on exposed side, mottled with yellow spots, numerous white dots sprinkled over the yellow portion; stalk about 1 in. long; cavity, deep and somewhat corrugated; calyx, closed; basin, of moderate depth, wrinkled; flesh very light yellow, grain half-fine, crisp, juicy, sub-acid, not rich, nor high flavored, probably a good cooking apple, but not desirable for dessert; core, large, also some indications of a tendency to decay at the core.

Mr. Allan says of it: "In eastern Ontario will no doubt be an acquisition in its season. It would not ship well, at all events not to Britain, but in local markets would be attractive. Coming in the same season as Wealthy it can hardly, with our present experience, be commended, as this variety succeeds so well over such a wide area.

McMahon's White, Wisconsin, G. P. Peffer. Tree is said to have endured several seasons of 40° F.; fruit, very large; $2\frac{3}{4}$ in. to 3 in. long; circumference, $10\frac{1}{2}$ in. to $11\frac{1}{2}$ in.; irregular oval, flattened and broad at the stem end, narrowing broadly towards the eye; skin, yellow, delicately tinted on the sunny side, sprinkled very thickly with obscure specks, especially towards the blossom end; stalk, an inch long, moderately stout, curved; cavity, deep, broad, irregular, russeted; calyx open, segments reflexed; basin, broad, deep, irregular, wrinkled; flesh, white, coarse, breaking, moderately juicy, sub-acid, with some body, yet not rich nor high flavored; core, remarkably small for so large an apple. An excellent cooking apple, well worthy of trial in our colder latitudes.

Mr. Allan says this is "an attractive apple, but the color not suited to markets. A fine fall cooker." The tree is one of the finest types of an apple tree that can be found; strong, vigorous, and healthy; has never been injured by the Ottawa winter, and has proved fairly productive.

Scott's Winter, Vermont. Fruit, medium to small; $2\frac{1}{4}$ in. to 2 in. long; circumference, $8\frac{1}{2}$ in. to 8 in.; round oval; skin, greenish yellow ground, marbled and striped with dull dark red, very dark where most exposed, numerous minute white specks

scattered over the surface; stalk, short, very stout, scarcely extending above the cavity, which is moderately deep, round, smooth, russeted; calyx closed, segments reflexed at the tips; basin, broad, of moderate depth, and somewhat wrinkled; flesh, almost white, firm, juicy, almost fine grained, breaking, sub-acid, pleasant flavor at this date, Oct. 23rd. Should be tested when in season to form a just opinion of its quality.

Mr. Allan says: "Color good for market, but too small to be suitable for export, or indeed any market, and quality not good enough to recommend it for dessert." Valuable as a late winter apple. Tree hardy and fairly productive.

Orange Winter. Mr. Craig thinks it originated in Wisconsin with the late G. P. Peffer. Possibly this is identical with Clark's Orange of some catalogues, which is said to have originated in Pewaukee, Wisconsin. Fruit, large, $2\frac{1}{2}$ in. long; circumference 10 in.; irregular, conical to oblate; skin yellow, thickly sprinkled with brown specks; stalk, short, moderately stout, usually not extending above the cavity, which is deep, broad and corrugated; calyx, closed; segments long, narrow, pointed; basin, moderately deep and wrinkled; flesh, yellowish, almost coarse, crisp, juicy, sub-acid with considerable body but not rich; flavor, pleasant. Probably a "very good" cooking apple in its season, and ranking as "good" for the dessert. The specimens received indicate it to be an early winter apple when grown in the climate of Ottawa, and the season claimed for Clark's Orange is November to January.

Mr. Allan says: "Has a mild flavor, lacking character, that makes an apple desirable for Ontario, but valuable locally on account of hardiness. Would ship as a fall apple, but color not suitable for value."

Tree at Ottawa has proved a sound topped, symmetrical grower, and has been uninjured by winter so far.

Salome. Originated in Illinois. Tree said to be a strong grower, equal to Wealthy in hardiness, to hold its fruit firmly even against strong wind storms, and to be an early and annual bearer, though yielding a heavier crop on alternate years. Fruit medium or less, $2\frac{1}{2}$ to $2\frac{1}{4}$ in. long; circumference $9\frac{1}{2}$ in.; conical to oblate, somewhat ribbed; skin at this date, October 24th, light green splashed and nearly overspread with dull red, which is very pale and much broken, profusely sprinkled with light dots; stalk, long, 1 in., slender, curved; cavity, broad, moderately deep or deep, smooth; calyx, closed; segments small, erect; basin, shallow, broad, corrugated; flesh, greenish white, almost fine grained, crisp, juicy, sub-acid, having seemingly considerable body, but the flavor told that it was quite unripe; core medium.

Mr. Beadle first saw this apple at a meeting of the Western Horticultural Society in New Orleans, several years ago, in the latter part of February. The samples shown there were much higher colored than these from Ottawa, and seemed to be in season at that date. They were grown in Illinois. It is claimed for this variety that with ordinary care it keeps well until July.

Mr. Allan says it "is too small for market value, and quality not quite good enough to be of value for general cultivation in Ontario."

Mr. Craig says the tree has done remarkably well at Ottawa, but has not been productive, although hardy. The first samples of fruit were produced this year on trees planted six years ago.

Cross Russian. Fruit, large, $2\frac{1}{2}$ in. long; circumference, $10\frac{1}{2}$ in.; form irregular, flattened; skin, yellow, ground mottled and splashed with red, in some blotched with russet, sparsely sprinkled with minute dots; stalk, short, about $\frac{1}{2}$ in., stout, straight, not exceeding the cavity, which is deep and large, russeted, in some specimens slightly corrugated, in others irregular; calyx, nearly closed; segments, large and stiff; basin, broad, shallow and often irregular; flesh, nearly white, coarse, not juicy, without flavor, possibly over ripe; core, small. Of doubtful value in any climate.

Mr. Allan says, "a fine, large, high colored apple of the Alexander type, without quality." Only commended for localities where other varieties, by reason of climatic difficulties, cannot be grown.

Longfield Russian. Fruit, medium, $2\frac{1}{2}$ in. in length; circumference, 8 in.; form, in some oblate, in others, conical; skin, yellow, slightly tinged with reddish brown on the

exposed side, scatteringly sprinkled with minute specks; stalk about $\frac{1}{2}$ in. long, slender; cavity, shallow, russeted usually, sometimes the russet is wanting; calyx, open; segments, long and tapering; basin, shallow, slightly wrinkled; flesh, white, almost fine grained, juicy, mild, sub-acid, breaking, not rich, yet of agreeable flavor; core, medium, of value only where higher flavored sorts do not endure the climate. Fully ripe now, October 23rd, 1894.

Mr. Allan considers it too poor in quality to be useful. Tree hardy and very productive.

Sibirsk No. 5, Russian. Fruit, medium to small; length, $1\frac{7}{8}$ in. to $2\frac{1}{8}$ in.; circumference, $7\frac{1}{2}$ to $8\frac{1}{4}$ in.; form, irregular oval, obscurely ribbed; skin in some, dull red, in others, bright red, and some without red on shaded portion, a few minute dots can be seen on close inspection; stalk, short, sometimes not projecting beyond the cavity, stout; cavity of modern depth, round, smooth, usually russeted; calyx not always completely closed; segments, coarse, long and bluntly pointed; basin, shallow, usually irregularly plaited; flesh, greenish white, almost coarse, not juicy, not much flavor, and what there is, disagreeable as if unripe, though quite mellow and possibly over-ripe; core, large for the size of the fruit. Cannot be of much value anywhere.

Mr. Allan calls it too poor and too small for value. Mr. Craig says this fruited as a top graft for the first time.

Melonen, or Melon Apple, Russian. Fruit, medium; ovoid conical, slightly ribbed, especially towards the eye; skin, dull red, decidedly darker in the sun, a few white specks barely discernible; stalk, long, $1\frac{1}{4}$ in., slender, curved; cavity, narrow, deep, round, smooth; calyx, closed; segments, pointed and reflexed; basin, shallow, of moderate breadth, irregularly plaited; flesh, greenish white, almost fine grained, moderately juicy, mellow, bordering on sub-acid, with a poor, disagreeable flavor; core, medium. Not worth growing in any part of Ontario.

Mr. Allan considers it poor in quality and undesirable. Mr. Craig says it is rather a pretty apple but entirely lacking in quality.

Green Crimean Russian. Fruit, above medium; length, $2\frac{1}{2}$ in.; circumference, 9 in., conical; skin, lemon yellow, thickly sprinkled with light specks; stalk, $\frac{1}{2}$ in., stout, not projecting beyond the cavity, which is deep, broad and irregular; calyx, closed; basin, shallow, broad, coarsely wrinkled; flesh, yellowish white, nearly coarse, juicy, tough, almost a very mild sub-acid, no flavor; core, medium. Can hardly be of any value this side of the north pole.

Mr. Allan designated it "too poor in quality to be useful."

Bombarger Russian. Fruit, large; length, $2\frac{1}{2}$ in.; circumference, $10\frac{1}{2}$ in.; form, oblate or conical, heavily ribbed; skin, light straw color, handsomely marbled with bright red on the exposed surface, very minute white dots are thinly scattered over the red, gray specks over the yellow portion; stalk, short, stout, not usually extending beyond the cavity, which is deep, broad and strongly corrugated; calyx, closed; basin of moderate depth, broad, heavily plaited; flesh, light yellow, crisp, almost fine grained, juicy, mild sub-acid, not rich, but pleasant flavor; quality, good. A showy fruit that should be valuable in our cold north sections.

Mr. Allan describes it to be "a large, well colored, fine appearing apple, but quality poor. It would prove valuable in the 'cold north,' its size and color would sell it in the British market, and it would ship there." Mr. Craig concurs in the first opinion given of this variety.

The following varieties have been examined by Mr. Allan only, and the descriptions are his:

From John Breckinridge, Goderich, Chance Seedling. Tree about 18 years old, a strong grower, spreading, irregular, very productive; fruit, medium to large, round, conical, pale green ground, striped and splashed with red; stalk, slender, about an inch long, inserted in a deep cavity; calyx, closed, and set in a basin, sometimes slightly corrugated with scarcely any depression; flesh, white, fine grained, sub-acid, pleasant, good. Would ship well after the New Year and keeps until June. Worthy of further investigation and trial.

From Abraham Rowand, Walkerton. Fruit, large; form and color very much like the Ben Davis; calyx set in a deep, corrugated, somewhat uneven basin; stem, short, set in a medium cavity, color splashed all over, covered with a fine bluish bloom; quality is good, fine grained juicy, slight tinge of pleasant acid, winter. Would make an attractive market apple, good shipper. This I consider worthy of testing further with a view of introducing.

The five following varieties were examined by Mr. Allan at Montreal Horticultural Society Exhibition. The descriptions are by Mr. Allan.

Cataraqui, a cross from Spy and McIntosh Red, by D. Nicol, of Cataraqui. It has markings of both kinds, follows Spy as a keeper as well as form, but higher in color. Quality equal to McIntosh Red, valuable for eastern Ontario on account of hardiness.

Winter St. Lawrence, as grown around Montreal is one of the most attractive apples I have seen for market. It thoroughly resembles our fall St. Lawrence in form and color, only of a much darker shade in coloring, and a late variety. Would ship well for winter and I am sure would be a favorite in market. Quality follows the fall St. Lawrence I fancy, although I did not of course test a ripe one.

Seedling, grown by R. Jack, Chateauquay. Large, green with yellowish tinge, strongly resembling cranberry Pippin in form; calyx closed, set in a deep corrugated basin; quality good, spicy, aromatic, sub-acid; stem stout, set in a deep basin; many specimens showing fleshy lip on stem; season, late fall.

Seedling, grown by Thos. Scott, jr., St. Laurent. In form and size resembling Wealthy; color green, covered with indistinct white dottings, splashed and streaked with bright red; calyx closed, set in uneven basin, depressed and corrugated; stem an inch long, set in smooth, deep cavity; quality good, acid, sprightly; flesh greenish white; should prove a good keeper and shipper; season, winter.

Seedling, grown by Geo. B. Edwards, Coney Hill. Large and smooth, resembling Cayuga Redstreak in form and color; calyx closed, set in a shallow basin, smooth; green, inclined to yellow, splashed with crimson and streaked; stem short and stout, set in smooth cavity; quality good, sprightly; season late fall and first of winter.

Crab Seedling. Sent by W. J. Kerr and grown by Ed. Burchell, Merrickville, Ont. Received by Mr. Craig. Quite a striking type of a keeping variety of the yellow Siberian Crab was received on October 8th, and kept in the warm temperature of my office for over a month. Size, $1\frac{3}{4}$ inches in diameter; round, with all the Siberian characteristics, but not markedly astringent. On account of its keeping qualities it should not be lost track of.

Plums. From A. M. Smith, St. Catharines, Ont. Received by Mr. Craig. Size, $1\frac{3}{8}$ by $1\frac{1}{4}$ inches, nearly round. Blue, with a thick purplish bloom, stem $\frac{3}{4}$ to 1 inch long; cavity, narrow and small, suture indistinctly marked; skin, thin; flesh, brownish color; juicy, fairly sweet and moderately firm; adherent to stone, which is small and roundish. Evidently of the Damson type, valuable on account of its lateness.

CONDENSED REPORT OF NEW FRUITS TO PRESENT TIME.

Report by the standing committee on new fruits, of progress made in summarizing all the work of the Association for the past and preceding years relating to new fruits.

Upon an examination of the work of the Association relating to new fruits during preceding years, your committee found that, beginning with the year 1868, new fruits had been brought to the attention of the Association during nearly every year of its existence, and that a great mass of material had been collected in its reports relating to new varieties of every fruit grown in this climate. We also saw that in order to make this material available it would be necessary to bring it into a condensed form, and that this involved a considerable amount of labor, so great that it seemed advisable not to undertake to prepare a condensation of the whole for submission at one time. Inasmuch

as the apple is our most important fruit, it was thought best to take that up first. Accordingly a table has been prepared showing as fully as possible the name and address of the exhibitor, the year when exhibited, the size, color, texture, flavor, quality, use and season of the fruit, and the remarks of the committee that examined the exhibit.

We learn from this table that there has been, during the past quarter of a century, a hundred exhibitors of new fruits, who had taken the pains to show us not less than a hundred and fifty varieties of new apples. Of these some thirty varieties are specially mentioned by the examining committee in terms such as the following, viz.: "Very promising," "think favorably," "desire to see them when in season," "not to be overlooked," "to be looked after," "worthy of trial," "well worthy of future notice," "prize of \$5 awarded," "worthy of extended cultivation," "first prize," "worthy of cultivation," "recommended for general cultivation," "deserves to be widely disseminated," "advise that the tree be inspected," "commended," "highly commended," and the like." We also learn that in by far the greater number of cases there has been nothing done in the way of following up the recommendations made, so that in the great majority of cases no practical benefit has accrued to the country from these labors. A glance at the table shows also that the information given regarding these fruits is often seriously defective. Very often no mention is made of the season of maturity, none of the quality, and often the recognized pomological terms for quality, "good, very good, best," have not been observed, so that it is not possible to know even when the term "good" is used just what meaning is intended. So likewise of all the other columns of the table, either nothing is said, or it is difficult to decide what weight should be given to what is said. When it is said that the flavor is "pleasant," or "aromatic," or "sprightly," without any further qualification, we are yet in the dark as to whether it is acid, sub-acid, or sweet.

It is probable that some of these apples are well worthy of being fully investigated, possibly young trees, or if not, very probably scions could be procured for many of them, and these, by grafting into vigorous trees in some of our experimental stations, could soon be brought into bearing, and the value of any of them for cultivation, either general or local, be ascertained.

Your committee deem it due to those who have been at the pains to submit new fruits, especially in the case of Canadian Seedlings, and due to the beneficial work of our Association, that the examination into the value of them be completed as speedily as possible. To do this would entail some correspondence, as well as securing scions of the most promising varieties which might be propagated for trial at the various testing stations for apples now being inaugurated by the Association. This phase of the question is respectively submitted to the Board of Directors for their consideration.

SEEDLING APPLES.

O. T. SPRINGER, Burlington, 1868: medium size, sub-acid, good, desert, February-March. Tree very hardy, annual bearer.

JAMES COWHERD, Newport, 1869. No. 2 like to E. Spitzenberg; very promising.

JAMES COWHERD, Newport, 1869: medium, very acid. No. 5 probably good keeper: not fully ripe.

JAMES COWHERD, Newport, 1873. Committee thought favorably of seedlings exhibited and desired to see them when in season.

A. FORFAR, Scarboro', 1869: medium, yellow, fine grain, agreeable, promising, desert, fall, No. 1, not to be overlooked.

A. FORFAR, Scarboro', 1869: green, firm, rich, promising, winter. No. 3 to be looked after.

W. E. COLEMAN, Lyn, 1870: very large, red, sub-acid, promising, late fall. Worthy of trial.

Mr. ATTWOOD, London, 1870: large, colored like Ribston, flavored like Ribston, very good. Best brought to our notice; is it a Canadian seedling?

D. HAMMOND, Sheridan, 1870: handsome, mild. Worthy of trial.

D. HAMMOND, Sheridan, 1872: medium to large, crimson, fine grain, sub-acid, good, October. Tree very hardy.

D. HAMMOND, Sheridan, 1873: large, yellow-red, tender, sub-acid, very good. Well worthy of further notice.

J. W. JOHNSTON, Campbellford, 1872 : medium, red, sub-acid. Tree 29 years, in bearing every year ; hardy. \$5 awarded.

W. L. STOTT, Markham, 1873 : above medium, yellow-russet, fine grain, aromatic. Prize \$10 ; worthy of extended cultivation.

Mr. STIBBARD and Mr. RUSSELL of London, Mr. COWHERD and Mr. GEORGE SMITH, of Brantford, in 1873, all exhibited seedlings which committee desired to see when in season.

D. NICOL, 1873 : promising.

LEVI TURNEY, Colborne, 1873 : large, first-class, baking. Tree over 70 years old.

CHARLES ARNOLD, Paris, 1874 : \$10 award for seedling. From Spy and Wagener.

CHARLES ARNOLD, Paris, 1879 : fine size, crisp, table and cooking named Ontario.

P. C. DEMPSEY, Albury, 1874 : above medium, sub-acid, very promising, named the Albury. Tree hardy, good and regular bearer ; first prize.

P. C. DEMPSEY, Albury, 1874 : full medium, fine grain, sub-acid, cooking, named Redner's seedling. Tree hardy, extremely productive, worthy of cultivation ; first prize.

P. C. DEMPSEY, Albury, 1878 : above average, red, aromatic, market, named the Hastings. Recommended for general cultivation ; good crop every year.

P. C. DEMPSEY, Albury, 1880 : large, greenish, firm, sub-acid. Possesses more merit than the majority of this class.

P. C. DEMPSEY, Albury, 1880 : medium, green-yellow, sub-acid, high flavor, named Prenyea. Deserves to be widely disseminated.

P. C. DEMPSEY, Albury, 1881 : dessert, October, named Prenyea. Said to be one of the best of its season in Prince Edward county.

P. C. DEMPSEY, Albury, 1881 : large, green, cooking, mid-August, named Taylor Fish. An English apple.

P. C. DEMPSEY, Albury, 1881 : medium, high, the Hastings. Reputed one of the best of its season for table and market.

P. C. DEMPSEY, Albury, 1882 : Prenyea of Prince Edward county. Sweet. Lacks character to entitle it to general cultivation.

P. C. DEMPSEY, Albury, 1882 : Hastings, local, tree hardy, suitable to cold districts, productive. Said to be a fine shipper.

P. C. DEMPSEY, Albury, 1882 : Taylor Fish, at Cherrydale farm, Huron county, considered best large fall apple grown there, especially for cooking.

P. C. DEMPSEY, Albury, 1882 : large, white-red, crisp, sub-acid, medium, August. Grand Sultan, foreign, large cropper.

P. C. DEMPSEY, Albury, 1882 : red, sub-acid. Grand Duke Constantine, foreign.

GEO. PEACOCK, Mt. Salem, 1874 : handsome, sweet, baking. Tree owned by Samuel Tedford, Gravesend, Elgin county.

DAVID BRADT, North Glanford, 1874 : large, russet, good, promising. First prize.

DAVID BRADT, North Glanford, 1877 : medium to large, russet. Shown as a late winter apple for the \$50 prize. Committee on 7th February, 1877, in doubt and advise a committee to investigate.

E. BLAGDEN, 1874 : handsome, good, fine. So like Spitzenberg, committee advise the tree be inspected when in fruit.

THOMAS CALDWELL, Dundas, 1874 : very large, red. Resembles Blenheim ; frozen ; merits not ascertained.

JAS. CLARKE, Belleville, 1875 : medium, yellow-red, crisp, sweet, fall. Prize \$5 ; advise its wider cultivation.

A fine display : of seedlings, October 6th, 1875, 19 lots winter fruit, cannot now be passed upon. They came from Mr. WILSON, Whitby ; J. GRAHAM and B. H. VANDEVOORT, of Sidney ; H. J. LOTT, SAMUEL WIENER, Jordan ; P. C. DEMPSEY, Albury ; Messrs. COSNER, of Bay of Quinte, and Hon. LEWIS WALL-BRIDGE, Belleville.

Mr. BELL, 1876 : good, dark-red. Graft obtained from original tree about 20 miles north of Ottawa, Gatineau Belle.

A. T. GREGORY, Mt. Forest, 1875 : January. Very fine, late fall, recommended for cultivation ; if a seedling, worthy of a prize.

A. T. GREGORY, Mt. Forest, writes : See Report, 1876, page 49, that it is a seedling ; tree early bearer ; now 12 years old ; requests inspection.

DANIEL B. HOOVER, Almira, 1876 : medium. Tree standing on lot 34, concession 6, Markham ; seed sown in 1813 ; very hardy.

DANIEL B. HOOVER, Almira, 1879 : medium, red, fine, sub-acid, almost equal to snow, January. No. 1 recommended for cultivation ; tree hardy, productive.

DANIEL B. HOOVER, Almira, 1879 : large, coarse, fine, cooking. No. 2 tree 35 years old ; hardy, productive ; named by Mr. Hoover Lady Washington or Hoover's Favorite.

DANIEL B. HOOVER, Almira, 1882 : medium, red, sub-acid, good, summer. No. 1.

- DANIEL B. HOOVER, Almira, 1882: medium, yellow, pleasant, late fall to January. No. 2.
- DANIEL B. HOOVER, Almira, 1882: below medium, red, crisp, sub-acid, winter. No. 3.
- DANIEL B. HOOVER, Almira, 1882: large, red cheek, sub-acid, good to very good, winter. Hoover's Favorite; would ship well.
- DANIEL WISMER, Jordan Station, 1877: large, handsome, tainted by cellar. \$5 prize; he writes February 6th, 1877, tree bears every year.
- WM. RUSSELL, London, 1877: Resembles Gravenstein, but past its prime. "London Beauty."
- J. BURROWS, Drummondville, 1877: medium, green-yellow, sub-acid. Want to see it in season; now October 31st.
- WM. ROY, Owen Sound, 1877: medium to large, handsome. Want to see it in season.
- WM. BROWN, Sydenham, 1877: large, not ripe. Want to see it in season.
- JOHN E. BULL, Weston, 1877: large, yellow, sub-acid, good to very good. No. 1.
- JOHN E. BULL, Weston, 1877: yellow-carmine, fine grain, sub-acid, first-rate, fall. No. 2; prize \$5.
- JAMES CLARKE, Cannifton, 1877: large, striped, sub-acid, early winter. Recommended for trial.
- SETH C. WILSON, Whitby, 1878: medium, good. Superior to Early Harvest for dessert.
- T. C. WHEATLEY, Sarnia, 1878: medium, handsome, very late winter. Said to keep until April.
- MAJOR ANDERSON'S, 1878: fair, yellow, good, fall. Commended.
- STEAD'S SEEDLING, 1878: small, handsome red, good, table. Commended.
- T. G. VIDAL, Sarnia, 1878: large, handsome crab No. 260. Highly commended.
- A. HOOD, 1878: crab. Mr. Hood says fit to compete in flavor with any apple; ripe about Sept. 1st.
- L. WOOLVERTON, Grimsby, 1879: above medium, yellow, bright, blush, crisp. Named Princess Louise.
- WM. ROY, Owen Sound, 1879: heavy blush, pleasant. Gives promise of rating well.
- SETH C. WILSON, Whitby, 1879: large, yellow-green, sub-acid, early September.
- At meeting of February 9th, 1880, a committee on New Fruits was appointed. A. McD. Allan, Chairman.
- J. H. RAMER, Markham, 1880: large; resembles Sweet Bough; out of season.
- A. M. SMITH, 1880: green-blush, sweet, good, cooking, winter. Cannot decide it to be really a seedling.
- GEO. COX, Goderich township, 1880: yellow blush; firm, tart, late winter.
- DR. WATT, Niagara, 1880: russet, fine, pleasant, dessert. Past its season, February 19.
- At Provincial Exhibition, 1880: medium, yellow red, fine, sub-acid, late fall. "Grimsby Beauty;" very handsome.
- J. G. TENEYCKE, Grimsby, 1880: above medium, yellow green, fine, sweet, good, fall.
- WM. ROY, Owen Sound, 1880: medium, good, dessert, fall.
- WM. ROY, Owen Sound, 1880: winter, three varieties; desire to see these in season.
- MR. McCULLOUGH, Sault Ste. Marie, 1880: a number of seedlings of Fameuse, several very promising, all fall. None named or numbered; can't designate which seemed most valuable.
- Provincial Exhibition, 1880: Pomme d'Or, too wild to merit place in a collection.
- Provincial Exhibition, 1880: Fallawater seedling. No improvement on its very ordinary parent; quality inferior.
- Report of 1881: Leslie crab, large, cream blush, sweet, preserving. Tree hardy, productive.
- Report of 1881: Baxter's red, very large, red, cooking, winter. Ironclad; fine shipping apple; originated at Brockville.
- Report of 1881: Cellini, large, green yellow, October. English; promising well.
- W. W. AUSTIN, Oxford county, 1881: medium, russet, crisp, sub-acid, best, winter. Even form, as if turned in a lathe; would sell as high or higher in Europe than American Golden Russet.
- Report of 1881: Cliff's Hawthornden, waxen, poor, as seen fall of '81 at Provincial Exhibition. Native of Prince Edward county; not desirable for extended cultivation.
- Report of 1881: Princess Louise, medium, firmer than Fameuse, improvement on Fameuse, dessert. Should be brought into general cultivation.
- Report of 1881: seedling of Spy No. 1, large, yellow green, sweet, pleasant, winter. Grown by Chas. Arnold, Paris.
- Report of 1881: seedling of Spy No. 2, medium, russet red, firm, acid, pleasant, winter. Grown by Chas. Arnold, Paris.
- S. FOWLER, Cambray, 1882: medium, two seedlings over-ripe, probably good cookers. January 18, '82.
- O. F. SMITH, Glanford, 1882: medium, red, over-ripe. January 18, '82.
- JOHN MCGILL, Oshawa, 1882: small, russet, good, May-June. Tree heavy bearer, No. 1.
- JOHN MCGILL, Oshawa, 1882: large, green, medium, December-February. Tree hardy, No. 2.
- JOHN MCGILL, Oshawa, 1882: large, russet blush, January-March. Tree very productive, No. 3.
- JOHN MCGILL, Oshawa, 1882: medium, russet-green, May-July. Tree very productive, No. 4.

- JOHN McLEAN, Owen Sound, 1882: White-blush, sub-acid, fair, summer.
- J. B. WALKER, Grimsby, 1882: medium, russet, medium, winter.
- ALEX. ROBERTSON, Verulum township, 1882: green, sprightly, good, winter.
- Mr. WIGGINTON, Goderich township, 1882: medium, crimson, fine, sprightly, good, fall.
- Mr. SAUNDERS, Owen Sound, 1882: medium, yellow blush, fair to good. Fine shipper.
- WM. BROWN, Owen Sound, 1882: above medium, russet, good, good keeper. Fine shipper.
- WM. BROWN, Owen Sound, 1882: resembling Grimes' Golden, long keeper. Fruit of 1880 in fair condition in August, 1881.
- Report of 1883: "Nonpareil," medium, yellow green and dull red, crisp, sub-acid, good, excellent keeper. Nova Scotia; largely grown there for the English market.
- Report of 1883; "Nonpareil russet," small, crisp, fair. Nova Scotia; largely grown for the English market.
- R. BRECON, Richmond Hill, 1883: No. 3, a russet, has character, poorly kept, may be of some value.
- Report of 1884 mentions Salome and Belle de Boskoop as attracting some attention in United States.
- Report of 1885: no report from New Fruits Committee.
- 1886: no report on new fruits.
- 1887:
- 1888: nothing on new fruits.
- S. REANY, north Pt. Elgin, 1889: above medium, golden yellow, fine, sprightly vinous, very good to best, fall.
- JAMES KEAN, four miles north of Orillia, 1889: below medium, crisp-fine, rich aromatic.
- S. P. MORSE, Milton, 1889: tender, sub-acid, of early harvest.
- T. C. ROBSON, Minden, 1889: above medium, yellow red, fine, pleasant, fair dessert, good cooking, October-November.
- F. M. ROBERTSON, Minden, 1889: medium, $2\frac{5}{8}$ x $2\frac{1}{4}$, yellow red, fine, crisp, sub-acid, not high, pleasant eating, good cooking, November.
- B. WILLSON, Wingham, 1890: very large, yellow red, tender, pleasant, good, cooking, October.
- The Haliburton, north of Peterborough, 1890: $2\frac{5}{8}$ x $2\frac{3}{8}$, yellow red, fine, acid, poor, end September.
- R. W. SHEPPARD, jr., Montreal, 1890: larger than Fameuse, otherwise the same except in color. "Green Fameuse."
- Mrs. RENAUD, Grenville, P.Q., 1890: large, green red, vinous, good, March-July. "Renaud."
- J. P. COCKBURN, Gravenhurst, 1890: medium, red, fine, good, October. "McMillan," origin county Stormont, lat. 46° N.
- R. BRODIE, Montreal, 1890: large $3\frac{1}{4}$ x $3\frac{3}{8}$, red, coarse, sub-acid, good, end September. "Golden White," Russian.
- G. G. HENDERSON, Hamilton, 1890: medium, pink and red, tender, aromatic, very good, winter.
- F. W. COATE, Cape Elizabeth, 1890: medium, $2\frac{1}{2}$ x $2\frac{1}{2}$, yellow red, half fine, nearly sweet, probably good, too ripe. Berezińskoe Beresina, Russian, from F.G.A.
- Mr. GREENFIELDS, received from Ottawa, 1891: below medium, green red, tender, sub-acid, possibly good, cooking, May-June. Quality poor, but scarcely ripe enough to be fairly judged.
- Rev. R. LEWIS, Maitland, 1891: medium to large, crimson, tender, aromatic, very good, October-November.
- D. NICOL, Cataraqui, 1891: "Mallory," resembling Fameuse, and of same season. Seems a good early market sort.
- D. NICOL, Cataraqui, 1891: "Gibson," large, like Black Detroit in color and flavor. Might be profitable for near market.
- D. NICOL, Cataraqui, 1891: large, highly colored, like Red Canada, more conical, lacking sprightliness, fine keeper and shipper.
- D. NICOL, Cataraqui, 1891: "Parrot," medium red, good shipper, late. Unless tree is extra hardy not commended for propagation.
- D. NICOL, Cataraqui, 1891: "Henderson," medium, early winter. Nothing striking in character.
- C. B. RICE, 1891: "Oakland." A nice apple.
- J. P. COCKBURN, Gravenhurst, 1891: small, poor, poor. Duchess x Snow.
- THOS. BEALL, Lindsay, 1891: fair, yellow. Received 2nd prize at Dominion Convention of Fruit Growers.
- P. C. DEMPSEY, 1891: medium to large, red, fair, late winter. Commended; No. 87; G. Russet x Spy.
- P. C. DEMPSEY, 1891: small, red. No. 90.
- T. H. RACE, 1892: large, red, good, good, fair keeper. Highly commended for propagation; grown Hibbert, South Perth.

S. C. WAIT, St. George, 1892 : small, poor. Lacks size and quality for profitable market.

"Dery," Syn., Alexis Baldwin and Pomme de Fer. Received from J. L. Dery, Mt. St. Hilaire, P.Q., October, 1891-92; tree examined October 23, 1892.

W. H. MURPHY, Ottawa, 1893 : "Calumet," medium to large, large, red, firm, sub-acid, good, March-April. From seed of American Baldwin planted seventy years ago; bears moderate annual crops.

W. H. MURPHY, Ottawa, 1893 : "Calumet," medium to large, $3\frac{1}{4} \times 2\frac{1}{2}$, yellow red, firm, sub-acid, good, all winter. From seed of American Baldwin planted seventy years ago; bears moderate annual crops.

Prof. CRAIG : The chairman of this Committee has been to a great deal of trouble in looking up a number of new fruits that have been exhibited before this Association for the last twenty years, and his report will show that we have had from time to time a great many new fruits exhibited, some of small value no doubt, but others probably of a great deal of value. These have been lost sight of from year to year. Now, I think that the recommendations that the chairman of the committee makes at the end of his report should have some action taken thereon, and I would move "That the chairman of this committee be authorized to correspond with exhibitors of seedling apples which have been reported favorably upon by the fruit committees of the Association from year to year, with a view of obtaining further information in all cases, and scions for testing where deemed advisable; and further that the chairman of this Committee be appointed a permanent officer of the Association, at a salary commensurate with the amount of labor involved." As a means to facilitate the work I would say that these scions which might be obtained by this chairman might be sent to me at Ottawa, and I would engage to propagate a sufficient number in each case to distribute to the trial experiment stations working in connection with the Association. That would give us an opportunity of getting at the values of these fruits, and at least would enable us not to lose sight of the varieties here exhibited from year to year, and also encourage the originators of new varieties to bring them before the Association.

Mr. A. H. PETTIT : I have pleasure in seconding the motion.

Mr. MORTON : I would like to know what you mean by the chairman of the committee being appointed a permanent official? As I understand it now, we have a standing committee upon New Fruits. Do I understand that an individual be appointed, or that an officer be appointed permanently? If the officer is to be appointed permanently—and in whatever remarks I make I am not to be understood as speaking against the chairman of the present committee—if it is proposed that an individual shall be appointed permanently I decidedly object to it on principle. In this institution we have no person appointed for longer than year to year. If that is the construction that is placed upon that I decidedly object to any individual, I don't care who he is, being appointed permanently. He should be appointed from year to year. If on the other hand you mean that this officer should be appointed permanently I think it is already covered. We have a standing committee appointed, and that must necessarily be permanent until it is changed; but it means that the whole three members of the committee are permanent officers of the organization; and if it is thought that instead of having a committee of three there should be one, it seems to me the motion should be in the direction of limiting that committee to one.

Mr. WHITE : It seems to me the essence of the motion is that the chairman of the committee should be a paid official and that the work is greater than should be done by any individual without remuneration.

Mr. A. H. PETTIT : Our committee meet to examine new fruits year after year, and they bring in a report. That report is brought in to-day taking up a whole series of years; and those fruits, many of them, are lost sight of entirely. We might direct that these specimens be further tested at our experiment stations, and if we have a fruit that is worth cultivation we have the assurance that it will be cultivated and disseminated throughout the province.

Prof. CRAIG : In answer to Mr. Morton I may say the resolution referred to the office.

Mr. MORTON : If you think the chairman should be paid, then you should omit all reference to his being a permanent official, and direct that he should be paid according to the decision of the directors.

Prof. CRAIG : I think Mr. Morton's views are quite reasonable. I will amend by saying that the chairman of this committee be appointed from year to year instead of being a permanent officer.

Mr. MORTON : I would think this would cover the ground, "That the chairman of this committee be paid such salary as the directors may approve."

Mr. MCNEILL : There is still another feature of it. Without appearing dogmatic at all, I think there is a precedent here that may be established—that we need to carefully consider before establishing it. There is some objection to expending money except in the most judicious circumstances. Is it wise to furnish the society with another paid officer? The Secretary is paid; I think that is the only paid officer in the association. Am I right?

The PRESIDENT : Yes.

Mr. MCNEILL : It is a very dangerous thing to introduce the principle. It is doubtful whether the precedent is not a dangerous one. I am in favor of paying well any man we do pay for his services, because it is understood he gives his whole time to the work, and the pay must be commensurate with the ability displayed; but where people give their time to it, not expecting remuneration, it is a very dangerous thing to introduce any principle of paying a certain individual because he gives a little more time than another. The same question comes up with payment of singers in choirs. By introducing the principle of paying the first soprano, we have had to pay the first bass, then others applied and we have had to dismiss the whole of them.

The SECRETARY : I have not heard the discussion and am not fully conversant with the points, yet there is one feature that we might consider. It is this, that we have already started out upon a new venture, and that is the experiment station work. Now, in each of these stations there is an experimenter who is to receive all new fruits, plants of all new varieties, and test them thoroughly, and every year report upon those, what they are worth in his vicinity, and how the plants and trees grow, whether they are vigorous or not, and whether adapted to that locality, and so on; and I just simply throw out this for your consideration, will not the reports of these various experimenters—we will have ten of them—cover the identical ground which you are proposing now to be taken up by this new official? I had an idea they would.

Mr. A. H. PETTIT : That is the very point on which I seconded the motion—that we shall have some authority to make the decision that a certain new fruit that he has found is worthy to be recommended to those men for cultivation. They might propagate hundreds of plants that would be of no value. We don't want the time wasted, but if it is worthy to be cultivated, the recommendation then will come from the chairman on new fruits for that purpose.

The SECRETARY : Of course the experimenter will test all new plants of every promising variety that comes up.

The PRESIDENT : This plan would be a feeder to the experiment stations.

Mr. MORTON : If that is the decision, we have nothing to do with it. The Government has seen fit to establish experiment stations and they ought to pay the cost of them, and we ought not to be burdened. It is true that we have something to do with it, but we are not responsible for that—we are simply as it were in affiliation—we are the report body upon the board of control; and if this person is to supplement the work of the board of control, then I say that the board of control should be the ones who should appoint that officer and make provision therefor. I think if this Association in their discretion wish this report on new fruits to be continued, it is unjust to ask the preparation of it without remuneration, and I for one would be totally averse to having an individual give so much of his time as must have been given for the production of that report without a certain amount of remuneration.

The PRESIDENT: I think Mr. Morton is wrong in one respect. If the Government sustains these experiment stations, we have a perfect right to provide them with the plants and recommend those plants. Why throw the whole thing on the Government? They have just got to go to work and hunt up those plants themselves. Now, it is proposed that this committee be a feeder to the experiment stations.

Mr. MORTON: You find in the constitution here how plants are to be given to them.

Mr. PETTIT: The Committee is appointed to-day on new fruits, and they make their report. Their report is quite favorable on three or four varieties, we will say. What are you going to do with it? If this committee consists of one person he could give more time and attention to it than a number of persons changed each year. It would be a guard to our experiment stations to have the fruits recommended by him for testing instead of the stations testing hundreds of things that are of no use.

The motion was put and as amended was carried.

REPORT OF NOMINATING COMMITTEE.

Mr. SMITH read the report of the Nominating Committee. The names of officers elected will be found on page 2.

The new President, Mr. M. PETTIT, was escorted to the chair and said: Gentlemen, I thank you for the honor you have done me to-day in electing me as your President. I little thought twenty years ago or more, when I became a member of this association, that I would ever be called upon to fill this honorable position, and I assure you I shall put forth every effort to advance the interests of the fruit growers of this province, and in attempting to do so I kindly ask the co-operation of the officers and members of this Association. (Applause.)

Mr. RACE: You see now I cannot deliver the President's address—(laughter)—but I will have to deliver my address as the ex-president of the Association. (The address appears on page 3.)

Mr. MCNEILL: Will you allow me the pleasure of moving a vote of thanks to our retiring President. Whether it is a usual thing or not I think a special vote of thanks is due him. He has filled the office not only with credit to himself, but with honor to the Association, and it would be a great mistake indeed to allow Mr. Race to retire without recognizing in some manner the ability with which he has performed his duties in the chair.

Mr. TURNER seconded the motion, which was carried amid applause. The vote was tendered to Mr. Race.

Mr. RACE: I assure you I appreciate very highly this expression that you have given. I retire from the position with a great deal of pleasure, because when I took it I felt I was not doing justice to the Association, as I didn't think that I was sufficiently interested financially in the results of the Association to warrant me assuming such a position. I have believed that these positions should be occupied more by men who are actually engaged in fruit growing, and putting me in the position while I was not actually engaged in fruit growing was something of an innovation; but if I have contributed anything to the interest and profit and success of the Association, I assure you I am very much pleased to know that I have done so. My intercourse with the members of the Association has been very pleasant and I shall never forget it, and I would not like to be cast out of it; and my influence, sympathy and hearty co-operation is with you as long as you will find me in the flesh, though I have not very much flesh to be in. (Laughter and applause.)

Mr. D. W. BEADLE moved the following resolution as to the death of David Nicol, which was seconded by Mr. Beall, and carried by a rising vote:

Resolved, That this Association desires to put on record its sense of the great loss which has been sustained not only by the Association, but by the entire province by reason of the sudden demise of the Director for the 3rd Division, Mr. David

Nicol, of Catarauqui. Chosen director in 1889, he brought to the F. G. A. of Ontario the benefit of his experience of many years as a fruit grower and horticulturist in the peculiar climatic conditions of that division, and won the esteem of all by his wise counsels and deep interest in every effort to advance the prosperity of our country. Honorable, upright and courteous in all his intercourse, we deeply mourn his sudden death, and tender to his bereaved family our deepest sympathy.

Mr. MORTON reported from the committee appointed to examine the Secretary's report on the Distribution of Fruits, recommending that the report be adopted.

C. W. HARTMAN (Clarksburg) read Mr. Mitchell's paper, that gentleman having been detained by sickness in his family.

FRUIT GROWING IN THE BEAVER VALLEY.

BY MR. JOHN MITCHELL, CLARKSBURG.

For the benefit of those who have never seen it, I will first endeavor to give a brief description of the "Beaver Valley."

It begins at Thornbury on the south shore of the Georgian Bay, and extends southwest for about twenty miles to Eugenia Falls, and is drained by the Beaver River. It has an area of about 280 square miles, of very fertile land. The scenery throughout the whole length of the valley is most magnificent.

Imagine yourself upon one of the lofty hills overlooking the beautiful farms, with orchards and fields of waving grain stretching out across the valley and up the mountain slopes as far as the eye can reach, with the towns of Thornbury and Clarksburg and the blue water of the Georgian Bay spread out before you as if it were almost at your feet. Such is a summer scene in the Beaver Valley.

It is admirably protected on the east and south by the Blue Mountains, and on the west and northwest by a chain of lofty hills almost as high as the mountains themselves, thus giving it a decided advantage as a fruit-growing district over many sections further to the south. Fruit growing has already attained a prominent place. Thousands of young trees are being set out and in the near future there will be a very large export trade in winter apples. Already two large apple houses have been erected at Thornbury where thousands of barrels of the best varieties of winter apples are stored, graded and repacked, each variety being shipped out in its proper season for use. Nowhere, perhaps, do such varieties as Spys, Baldwin, Ben Davis, Golden Russets, and Kings attain such perfection in quality and quantity as here. I have seen sixteen barrels of fine Baldwins taken off of a single tree owned by Mr. S. Webb, of Thornbury.

Also, such fall varieties as Ribston Pippins, Blenheim, Orange, Gravenstein, St. Lawrence, Twenty-ounce, and in fact almost all kinds of apples do remarkably well.

But if there is one kind of fruit in which the valley excels in more than another, it is the plum. This might be called the home of the plum. All of the best varieties that have been tested grow and bear to the greatest perfection, but on account of its early bearing and great productiveness the Lombard is considered the most profitable. Indeed, I have seen growing trees planted four and five years loaded until their branches touched the ground with fine, clean, large well-colored fruit.

Cherries grow as well as plums, but have not been so extensively planted.

Black knot is regarded as a fungous disease. It made its appearance here some years ago, but owing to the prompt and vigorous measures taken by the local municipal councils it has been kept under control and gives very little trouble.

Pears have not received much attention as yet, but some of the hardy varieties, such as the "Flemish Beauty," bear heavy crops of fine, large, clean fruit.

Small fruits of all kinds do remarkably well but are grown principally for home use.

Such varieties of grapes as Niagara, Brighton, Salem, Moore's Early, Moore's Diamond, Concord, Delaware, and others, winter on the trellis.

Peaches have not been grown for market as yet, although there are quite a number of trees scattered throughout the district, and some fine plates of Alexander and Crawford were on the table at the Clarksburg Exhibition this fall. The yield also is good, twenty baskets having been taken from a five-year-old tree in the village of Clarksburg this season.

In conclusion, I would say that the Beaver Valley is progressing rapidly, and in the near future will have an enviable reputation as a fruit-growing centre.

Mr. C. W. HARTMAN, of Clarksburg, who read the paper, added :

There are a few things that I might add to the paper sent by Mr. Mitchell, relative to the Beaver Valley, which has received some attention from fruit growers lately. There may be some persons who intend engaging in fruit growing, and who would like to visit the locality and investigate its advantages for themselves. The most direct way for most people will be to go to Collingwood; everybody knows where Collingwood is situated, it is the most enterprising town, with the exception of Orillia, in the province. It has had its meeting of the Fruit Growers' Association, it also has the largest meat curing establishment in Canada, and possesses a peculiar charm for lady newspaper correspondents in its wealthy, good-natured old bachelor mayor. The Blue mountains are quite close to Collingwood; they are an extension of the Burlington heights, and while Collingwood lies to the east of this range, the Beaver Valley is situated on the west side. Travelling west from Collingwood along the shore of the Georgian Bay for fourteen miles, you come to the town of Thornbury, which is situated at the mouth of the Beaver River, and on the G. T. R., turning to the south as far as the eye can reach is what is known as the Beaver Valley. It extends some twenty-five miles inland and terminates at Eugenia Falls. The tract of land along the course of the Beaver River west of the Blue mountains and east of the high range of hills on the west side of the valley comprises about 300 square miles, most of which is suitable for fruit growing, but some parts are much better adapted for certain fruits than others in the same district. The Beaver River rises in the township of Osprey, near Rob Roy, some thirty miles by winding ways from where it empties into the Georgian Bay. It passes through the busy village of FEVERSHAM, supplying the Patrons of Industry with abundant water power for their successful co-operative flour mills, then some five or six miles west it comes to the world-renowned Eugenia Falls, where it drops some 300 feet within the short space of half a mile into the Beaver Valley proper, then on a northerly course between the ranges before mentioned, passing the flourishing villages of Kimberly and Heathcote, it comes to Clarksburg and Thornbury, situated near its mouth, both busy places with large mills and factories supplied with power from this stream. Thirty years ago this valley was almost a virgin forest, but its earliest settlers believed in the possibilities of fruit growing here and planted out many orchards, fortunately the greater part with first-class winter fruit, and for the past few years over 50,000 barrels of winter apples have been shipped out of the valley yearly.

Principal Grant, in his splendid work entitled "Picturesque Canada," on page 574, speaking of the Beaver Valley, says that it is said to possess the finest climate, and to be without exception the finest peach growing district in Canada. I do not know where this information was obtained so long ago, but if it is correct that the further north that fruit of any kind can be grown to perfection the better the quality, then I can endorse the statement of that distinguished writer, and believe that peaches can be raised with profit on a large scale in the Beaver Valley; but I have had more experience in other fruits, particularly plums, and from observation, believe that with the same attention, a good plum orchard will be quite as profitable here as the orange groves in southern California.

It has often been asked lately why this particular valley is so well adapted for fruit. Some more experienced fruit grower may be better able to explain, but I imagine that its close proximity to the large sheet of water of the Georgian Bay, and the fact that the valley opens to the north has something to do with its fruit crop and freedom from disease. Possibly the river, fed as it is with springs flowing its entire length, may have

a beneficial effect, and the two keep the air cool in the early spring, preventing the fruit buds from opening until all danger of frost is over; the same bracing atmosphere may prevent the fungus affecting the foliage as it does in more southern localities.

Now, although I have no fruit lands of my own to dispose of, I am frequently asked questions about the profits of fruit farming in this district, and the facilities for shipping perishable fruit to market. We have at present the Grand Trunk Railway at the north end of the valley and the Canadian Pacific Railway at the south, some five or six miles from Eugenia. Both of these lines connect with Toronto and Montreal and other good markets in fast time and at reasonable freight rates. It is also more than probable that before long an electric railway will run through the valley, connecting the Georgian Bay with Durham or Mount Forest, thus giving a more direct route to Buffalo, which is always a good market for small fruits. A charter for a railway along a similar route has been granted, but the expense of operating an electric line is much less, and sufficient power is wasted at Eugenia Falls and along the Beaver River to not only operate a railway of that extent, but also to turn every threshing machine, cutting box, churn and sewing machine in the valley, as well as light and heat the houses along the line.

These, Mr. President, are some matters to be considered in connection with fruit growing in the Beaver Valley, that I have strung together on very short notice. With an agreeable climate, good shipping facilities, we only require to develop electricity to a point that it will kill the curculio, destroy black knot, pick and market the fruit, and the happy possessor of the fruit farm will have nothing to do but touch the button.

Mr. DEMPSEY : I would like to know if pear growing is carried on there ?

Mr. HARTMAN : Not extensively. It has been carried on with some success, and on the higher lands and the heavier soil it does better than in the valley. We suffered some ten years ago with a blight that affected the pears in all parts, and at that time the pear orchards were only set out—not very extensively either,—but the plum is the most profitable fruit that we have raised there yet.

Mr. FISHER : What quantity of plum trees are planted there, and how long have they been planted, and what is your export ?

Mr. HARTMAN : Our export from Thornbury Station alone amounts to a carload every day for about three weeks during the season, in baskets. That is just the plums alone. That is the output of the Beaver Valley.

Mr. FISHER : How many trees are planted and how many in bearing ?

Mr. HARTMAN : I cannot give you the acreage, but there are a great many acres of plum orchards throughout there ; I should say there are one hundred acres. Nearly every farmer has half an acre, and some have ten acres. I have sixteen trees that I keep count of, and one year after another they will average \$5 a tree profit. I have some 500 altogether.

The SECRETARY : What struck me on my visit there was the peculiar adaptation of the climate and soil of that valley to fruit and especially to plum growing. I never saw them succeed any better, not even in the Niagara district.

Mr. FISHER : Plum trees will stand 200 on an acre, and \$5 a tree means \$1,000, which is better than grapes.

Mr. HARTMAN ; Those are sixteen trees that I have given special care to, and under the most favorable circumstances.

DELEGATE : What is the variety ?

Mr. HARTMAN : There is the Washington and the Imperial Gage, which is a shy bearer. There is also a large plum, almost as large as the Washington, I don't know the name. Then we have the Victoria and the Lombard.

Mr. ORR : Does the Georgian Bay freeze over ?

Mr. HARTMAN : Yes.

Mr. ORR : Did you ever try the Yellow Egg ?

Mr. HARTMAN : Yes ; and they do well.

Mr. PETTIT : Where is your chief market ?

Mr. HARTMAN : We ship to Toronto principally.

Mr. PETTIT : When you speak of carloads do you mean full cars ?

Mr. HARTMAN : I mean all they can put into the express car ; they don't have a special car. I got that information from the express agent.

Mr. JAMES : What is the land worth in that valley ?

Mr. HARTMAN : It varies from \$30 to \$50 an acre.

A DELEGATE : What do you find the best variety ?

Mr. HARTMAN : The Lombard is the most profitable we have had.

Mr. CASTON : I find they are growing the German Prune a good deal ?

Mr. HARTMAN : Yes ; the last few years.

Mr. CASTON : It is fairly good for canning too ?

Mr. HARTMAN : Yes ; we have them shipped as far as British Columbia.

Mr. CASTON : Do you have grapes ?

Mr. HARTMAN : Yes ; Niagaras. The grapes are not grown there for export at all.

Mr. McNEILL : Do they stand on the trellis during the winter ?

Mr. HARTMAN : Yes ; I have covered some, but the last few years I let them stand up. Of course the Concord is all right.

Hon. C. DRURY : Mr. Gaymon, a lawyer in Collingwood, succeeded in raising a hardy peach tree. I was at that time director for this district on this Board, and I reported the fact to the Association. I think he honored me by giving it my name, and I have strong suspicions that that had something to do with the fact that it has, I believe, become extinct. (Laughter.) But I have been told, and learned from various sources, that peaches will grow in the neighborhood of Collingwood. (A voice,—“Yes, that is true.”) If that is true it is a fact that ought to be noted, especially as you are considering the Beaver Valley.

Mr. HARTMAN : We have had considerable experience in a small way in peach growing. The Early Crawford ripens very well. The next year after that severe winter that we had some ten years ago, we had no peaches ; the next year some of them were killed ; but we had some peaches from the village of Clarksburg, exhibited at the World's Fair last year. This year there were twenty baskets of ripe fruit taken off one tree, and the tree is quite healthy ; and I believe there are protected parts on the Beaver Valley where peach growing can be done to considerable advantage and profit. I think the Early Crawford peach can do very well there.

Mr. SMITH : Do I understand you to say there were twenty baskets of Crawfords off one tree ?

Mr. HARTMAN : Off one tree ; the baskets were plum baskets.

Mr. SMITH : I think our Niagara growers will have to take a back seat.

Mr. HARTMAN : I am not giving that as an average, but as just one sample.

Mr. W. G. ANDREWS, foreman for Dr. Aylesworth, said : In regard to the peach growing, you can rely on the reports Mr. Hartman gave. We grow peaches there to great perfection. Our next neighbor, Mr. Cox, has now seven fine trees bearing peaches every year, and we have been growing them this last three years from some two hundred small trees. Some of them are dead on account of the wet ground there, but the peaches can be raised there of the very best quality and with very little care. There is very great difference in the climate within a very few miles. We have a farm only five miles out of Collingwood, and during all the winter long the thermometer

would vary 10 degrees between our place and the village of Collingwood; and it is the same thing in Beaver Valley and the village of Thornbury. We grow pears to great advantage. Some Flemish Beauty we have had weigh 16 ounces. These large apples Dr. Aylesworth speaks of; I sorted out twelve Northern Spys weighing from nineteen and a half to nineteen and three-quarters ounces apiece. We have some six or seven hundred large apple trees that we expect this coming year 1,200 to 1,500 barrels of apples from. One great difficulty we find is the taking care of the fruit after it leaves our hands in shipping it. This year we shipped our apples to Winnipeg, and we had them graded into three grades and put up very nicely, but some of the best we put up were some of the worst when they got there on account of the rough handling in the transshipping at Owen Sound and Port Arthur. Barrels on the car and some times on the boat are piled up three tier high on end, and at other times piled on their side, and they are broken down; they pull down the bottom barrel and let the others come down with a crash, and the apples are damaged from one end of the barrel to the other; that is our great trouble.

Mr. McNEILL: I think one of the most important questions that can come up is the handling of fruit, and I believe the best results will not be got unless by some concerted action. I believe that the transportation companies are only too anxious if they are backed up by the fruit growers to see that this fruit is properly handled. I have followed my own consignments of fruit, and I find the transportation company is perfectly willing to rectify any evils in shipping that can be traced directly to their men, and the express companies have reimbursed me, and through me my customers, for rough handling simply. I have now two cases pending of rough handling. I make a point to investigate every case, and let the companies know that if there is any rough handling or any baskets tampered with, they are just as certain to be followed by me as they are by death. I secured the discharge of one messenger from the Canadian Express Company simply for rough handling. We were in a great hurry, and I found him standing at the door of the car, and throwing grapes in across the full length of the car. I remonstrated with him, and he said, "You don't know anything about it." I said, "You will know more about it before I get through with you"—so I took the job out of his hands, and he attempted to put his hands on me, and he called the agent, who, seeing I was in earnest, let me pile that car myself. I made a complaint to the officers of the company, and I had the satisfaction of knowing that that messenger was discharged. We are to blame ourselves to a large extent. I think that both express and railway men should help us in this matter. Goods sent by express go to their destination worse than goods sent by freight, and boat men apparently are worse than every other, as far as my experience goes. My suggestion is that, as far as this association can possibly do it, we should instruct shippers of fruit to follow every consignment, and follow any destruction by rough handling with letters and inquiries and investigations until they make it so tiresome for those messengers and the deck hands and others who handle this that the companies will employ none but careful men.

Mr. ANDREWS: We find that the fruit gets a great deal more rough handling in shipping west than in shipping east. The Canadian Pacific Railway, seem to have had all their own way in goods going to the west, and it is a very hard matter to do anything at all with them. There is competition eastward, and hence less trouble.

The PRESIDENT: This question of rough handling of fruit is one that has been discussed a great deal in the past and is a very important one, and I don't know but the remedy lies in this way of following it up as vigorously as Mr. McNeill did.

NOTES ON STRAWBERRY GROWING.

W. W. HILBORN, Leamington, said: I am often asked the question "What is the best method of cultivating strawberries?" To answer that question we must know the conditions in which they are to be grown. The strawberry plant requires about the same in all parts of the country. It does not matter where you have the plant, the

requirements are about the same. The conditions vary so in the different parts of the country that we have to vary the cultivation to suit the conditions and to get these requirements. It is therefore impossible to give any directions that will be useful in all parts of the country. On general principles the strawberry plant wants a nice, mellow, loose soil with plenty of moisture but not too much water; water not too near the surface. It won't stand wet feet, it being a small plant and with just, I might say, a crown and some fibrous roots and small top which is easily affected by the changes of the weather. Even although we have favorable weather previously, a few dry days at ripening time will lessen the crop one-half and sometimes more; so that what we want to get at is to regulate the moisture. We may have never so good a soil, give the plant all the manures, commercial or otherwise, that we have a mind to, but if we cannot regulate the moisture our crop will be a failure or a partial failure. The strawberry is made of about 80 per cent. of water. The plan I usually adopt for cultivating is to plant in rows four feet apart and about a foot to one and a half or two feet apart in the row according to the variety. Some varieties grow stronger than others. I plant as early in the spring as possible. If the soil is a clay loam, it should be prepared in the fall by plowing and throwing up to the atmosphere. If it is a sandy loam it would require to be plowed and worked in the spring and thoroughly prepared. I plant by using a spade. In the first place mark off in rows with a corn marker four feet apart, and have one man to set down the spade and give it a pry one side, and a man follow and put in the plants, pressing the soil very firmly, having the top of the plant to come about level with the surface of the soil.

Mr. BOULTER: You prefer that plan to putting it in by hand?

Mr. HILBORN: It is putting it in by hand. You make only an opening by spade and put the plant in, and press it in firmly with your hands. If the weather is right, if you have just nice growing season right through, it might answer to use spuds to press the earth, but if it is not right it won't answer. Many of the plants may not show failure for a month, but during the season they will fail. I open the place with a spade so as to admit the roots to go straight down and spread out in fan shape as you go down, and press it with the fingers, and press it so firm that you could jerk off a leaf without moving the plant; then they will come through all right. After planting we start cultivating at once. There's where one great mistake is made with most cultivators. After the plant is in they think the job is done for some time, and perhaps when they come back again they find the weeds up some two or three inches high. It is not right. As soon as the weeds sprout is the time to kill them. One half the work at that time will be more good than double will later on. If the season should be dry this cultivation is a very important matter and should not be lost sight of. Many people think that when the weeds do not grow cultivation is not necessary. If there is plenty of rain to keep the plants growing, and there are no weeds growing, then the cultivation is not a serious matter; but if there are weeds growing or if the weather is dry, it is a consideration. We can keep moisture in the driest season if we manage the cultivation properly, and I think that that cultivation is the most important point to watch in the growing of fruits. Now, during the last few years we have been troubled, especially in our section, with drouth during most of the summer. Well, if we neglect this cultivation in the early part of the summer, all the extra cultivation that we can give later on won't make up for it. We must hold the moisture while we have got it, for the weather is very dry and hot and of course the evaporation is going on very rapidly. Well, if it is allowed to form a crust only for three or four days, the evaporation comes to the top and of course escapes. The dryer the weather the oftener we should cultivate, even to every other day or at least twice a week for small stuff. That gives us a loose mulch top soil and prevents evaporation. Cultivation cools off the soil and causes dews to be deposited at night down into the soil and gives us moisture in that way. A very good plan is to cultivate in the morning before that moisture has evaporated again. You will save a little in that way. Now that we have got the plant started to grow, I always cut off all blossoms and all runners of the newly set plants. If the plant has grown sufficient to send out about four or five runners at once then I let them go in the form of a matted row. We all know that in planting a row of

strawberries sometimes runners will run out this way and sometimes another way—sometimes ahead and sometimes back. By watching that we can have all the runners go the one way, and it makes quite a difference afterwards and in the appearance of the rows. Every plant in is a sort of runners hape. The runner runs out here, sends out another runner and goes on. From this side from which the runner starts out, that side of the plant will always send out the runners for the following season, or when it begins to grow as the case may be, and in planting put them in on that side and your runners will always run on that side and it will save you a great deal of trouble. It does not disturb the plant and it grows much better. I have found it is better to keep the row rather narrow in most soils; in cultivating keep it down to perhaps a foot in width.

Mr. BOULTER : That is pretty narrow.

Mr. HILBORN : It is pretty narrow, but if the soil is good it is all right.

Mr. BOULTER : And four feet apart ?

Mr. HILBORN : Four feet apart. When you come to pick you will find there is just barely room for the pickers to get in there without tramping the vines; but if you have it wider and it should be a wet season the berries get very soft and I don't know that you get any more fruit, because by musing the vines in picking you injure them, so that they don't perfect nearly all the fruit that sets; while if it is narrow the plants are not injured so much and they are brought to better perfection, and I think you get more for it of better quality and certainly more firm, which is quite a consideration in strawberries. In the fall as soon as the ground freezes two or three inches deep we like to mulch them with any coarse material, coarse straw or anything that we can get that will not lay down too compactly, and put most of the mulch between the rows, but very little directly over the plant, just enough to barely cover them from sight. It is safer on general principles to mulch, although in our locality we find sometimes that those that are not mulched give out just as well as those that are. I usually recommended a renewal system. Plant one spring; take off the crop the following, and where you have planted on land take off perhaps a catch crop the second year; but plant your new plantation for spring and depend upon that.

Mr. BOULTER : It is the safest.

Mr. HILBORN : It is the safest, and I have found in our high, dry, sandy soil that especially when we have those dry seasons and old bed that has been out perhaps two or three years will give a better yield of fruit than a new plantation that you have taken the greatest care of.

Mr. BOULTER : I know that from experience. I paid a man \$1,000 for what strawberries he brought me off three acres in the second year, and he didn't put an hour's cultivation on them, but he just happened to strike the right year; however, that is not good policy to follow out.

Mr. HILBORN : No, but there are cases of that kind. Among the many varieties I have tested I have selected about a dozen that seem to stand at the head just now; but I might say that it is very hard to come down to varieties, because what will do well with me or my cultivation may not answer so well with my neighbor not three miles away from me. But there is this one thing that might be borne in mind, and one that will go to show the value of our experiment stations—there are hundreds of varieties of plants sent out throughout the country, and I will say that I myself have tested about two hundred varieties of strawberries—we can get these varieties together at these stations, and test them and simmer them down to a few or to a dozen varieties; then that few we can have more generally tested throughout the country at very little expense, and we can safely pick out these few and say: Those have sufficient merit to give them a trial, while the balance of this hundred or two hundred varieties would not be worth testing in a general way. Well, I have simmered them down to about this: Bubach No. 5, Crescent, Wilson, Williams, Beder Wood, Woolverton, Saunders, Lovett, Parker Earl, Captain Jack, Gov. Hoard, Warfield No. 2.

A DELEGATE: Is that in their order of quality?

Mr. HILBORN: That is about in their order of value.

Mr. BOULTER: Why do you put Crescent second?—because it is large, luscious looking, better yield? Does it bring the money?

Mr. HILBORN: Because in most parts of the country the Crescent will yield \$2 worth of fruit to one of Wilson. In my own place I would rather plant the Wilson by far in preference.

Mr. CASTON: Don't you find the Bubach makes very few plants?

Mr. HILBORN: Not with me; it makes sufficient plants. The Wilson makes a good fertilizer for the Bubach or the Crescent. In gathering, the berries should be gathered separately. We plant usually either two rows to fertilize with, or four rows. Of the pistillate variety we usually put in four rows, and two rows of some staminate to fertilize it, and generally we get the best yields from the pistillate variety.

Mr. CASTON: What one did you put after Wilson?

Mr. HILBORN: Williams, I think, but it varies a good deal and I am not sure that it will stay there. Anything that I give you this year I wish to be allowed to change another year or at any future time in regard to varieties, because it seems impossible to find varieties that remain constant. They will exhibit some weakness in a year or two that we have not seen before.

Mr. CASTON: What do you think of the Woolverton?

Mr. HILBORN: The Woolverton has succeeded very well with me. It is very large, fine quality, and firm for such a large berry, and certainly of the finest appearance of any of the large berries.

Mr. CASTON: Is it going to be firm enough for shipping?

Mr. HILBORN: I think so. It will ship to quite a distance, I think as far as any of the large berries.

Prof. HUTT: What do you think of fall planting?

Mr. HILBORN: I would not recommend it at all; not that it cannot be done, but nine times out of ten it will prove a failure to the plant, for the reason that the strawberry is such a small plant that if we don't have a favorable season it does not get sufficient hold to stand the winter; it is easily heaved out and there is nothing gained by it. Except you wanted to cultivate a new variety it does not pay to fall plant. If you plant in the fall under ordinary circumstances, you have, we will say, half as much cultivation to put on that plantation as you would if you planted in the spring, or one-third as much at any rate, and the following spring under ordinary circumstances you get but a very small return of fruit; and if the plants are not mulched they won't amount to much because they are just a narrow, small row—they haven't spread out enough to amount to anything and you cannot expect much fruit from them, because the plants are not there to produce it. The plants are liable to heave out, and if they do, there is all that labor and you get no cultivation; whereas if you plant in the spring you get a fall crop the following season, and not so much difference in cost as the difference in profit would warrant.

A DELEGATE: What cultivation would you give it the second year?

Mr. HILBORN: That would just depend. It sometimes happens that a plantation is in such a condition the second year that you can give them the kind of cultivation you would like to, and you have got to vary that to suit. Sometimes I found it was best after the first crop was picked, if they had been mulched, to take off the mulch—either to burn it or rake it off—and then plow between the rows after laying down the tops; but if the weather is very dry and hot and the soil dried out, that is not a very good treatment. Work it both ways with a harrow and tear out all the plants you can; but if the weather is dry you cannot give them that treatment. Sometimes you have to let them go for some time until you get a rain, and you must watch the weather, and if it is

a little late in the season I would not advise the plow—I would just go in with the cultivator and work up the soil the best I could with that, and even clean out with the hand-hoe or whatever way you can do it most quickly and cheapest.

A DELEGATE: Do you ever give a cultivation in the spring?

Mr. HILBORN: I do sometimes. In case I don't mulch I start the cultivator as soon as the weather is suitable in the spring, and on our light soils in dry seasons I think you can keep up the moisture even better that way than you can with the mulch.

Mr. CASTON: Cultivate right up to fruiting time?

Mr. HILBORN: Right up to fruiting time.

Mr. TURNER: When you are fixing up the beds the second year, don't you consider the plants you leave in are in the same condition as a fall-planted bed?

Mr. HILBORN: Yes, but new plants certainly give the best results, and in cutting out, where you can do it, if the plant runs sufficiently, I would leave the new row where the new plants are and cut out where the old plants come as near as you can.

Mr. TURNER: Then why wouldn't fall-planted plants do?

Mr. HILBORN: I wouldn't recommend fall planting, because you cannot get a stand of plants sufficient for a crop the following spring. It can be done on a small scale, and for family use I would recommend it every time if a man has no strawberries, by all means to plant in the fall rather than to wait for another year.

Mr. CASTON: I always recommend that if we can get sufficient moisture in September, to plant by all means in the fall.

Mr. HILBORN: What do you gain by it?

Mr. CASTON: The plants are farther ahead for the next season.

Mr. HILBORN: We can get all the matted row we require in the next season.

A DELEGATE: If you get a good season, you get a better rooting by planting in the fall.

Mr. HILBORN: There may be conditions where that's right.

AFTERNOON SESSION.

The SECRETARY moved that there are so many papers coming on that the paper by Mr. E. B. Edwards, of Peterborough, on "Co-operative Apple Growing" be taken as read and published in the proceedings. This motion was seconded by Mr. Morton and carried.

CO-OPERATIVE APPLE GROWING.

I advocate the extension to apple-growing of the principle of co-operation, which has already been found of so great advantage in other branches, and more especially, so far as farmers are concerned, in the matter of cheese-making. This co-operation may be on a small or on a large scale. It may be only the friendly union of two or three farmers in a neighborhood, or it may include a township or a whole county, and it may apply to those who have only small orchards as well, or perhaps even better than to those who have large ones, for the latter are generally better able to take care of themselves.

1. Co-operation may well begin with the gaining of knowledge on the subject. The two or three may make it a point to compare notes and exchange ideas and information, and the larger body may hold meetings and secure the presence of those who are able to impart instruction, with regard to the kinds of apples to grow, the best modes of growing them, and the best modes of disposing of them.

2. As a second step co-operation in buying trees for planting will secure the advantage not only of lower prices by ordering in larger quantities, but also of greater attention to the order, the prevention of the petty frauds of the tree peddler and greater satisfaction in every way. If I want fifty trees and two of my neighbors want twenty-five each, each of us will gain by sending in an order for one hundred trees at the lower rates that are offered for that quantity. This is an obvious and immediate advantage affecting the pocket, and is one that is within the reach of a small number who may choose to unite, as well as of a larger number.

3. When the orchard is in bearing there may with advantage be co-operation in such a matter as spraying, where the size of the individual orchard does not seem to warrant the providing by each one or a proper spraying pump. Two or three farmers in a neighborhood may purchase a pump and provide the materials between them, or a larger number may arrange with a man who owns an outfit to make a round of their neighborhood at the proper times. Many a farmer neglects to spray his orchard, because he thinks it hardly worth while to get a pump for himself, or because at a busy time he does not want to be bothered with something that he knows very little about.

4. When the apples come to be picked and marketed there is not only a fresh advantage to be gained from co-operation in marketing them, but there is a summing up of all the advantages already gained, the test and realization of the work of the earlier years. The knowledge and information gained, the prudent selection of varieties suitable to the locality and suitable for the market, the care in training the trees from the first year upward, the spraying, the tilling, and manuring of the ground, are all telling upon the crop produced. If the kinds of apples have been carefully and judiciously selected to begin with, the co-operating neighborhood will become known for certain good varieties of shipping apples. If the trees and the ground have been properly cared for and the trees have been properly sprayed, it will also become known for the quality of the fruit produced. Buyers will be attracted to such a neighborhood and if an immediate sale be made to them better prices will be obtained on account of the uniformity and quality of the fruit, and that without any combination to keep up prices. Or, if a shipment to the English or other market be determined upon, the advantage of co-operation becomes even more apparent. The man who has only an acre or two of orchard has not a sufficient quantity to ship by himself. By uniting their forces two or three, or a larger number, may make up a carload or a larger quantity, and thus secure the advantage of the greatly reduced rates applicable to the larger shipment. Having a larger quantity, too, there is an advantage in dealing with the commission agent and the better knowledge of the market.

5. For windfalls and fallen fruit co-operation may secure a joint evaporator. This is a matter of great importance, not only to provide a proper means of disposing of this class of fruit, but also to avoid the unwise course of glutting the market with poor and decaying apples, which disappoint both seller and buyer. This evaporator may be either on a large scale in a town or village, or may be a smaller one for a smaller neighborhood.

To sum up, I recommend the formation of county societies to bring together all those who are interested in the subject at stated intervals, and to hold meetings for discussion and gathering information, and to work together as far as possible in the directions indicated. In addition to this the apple-growers in a locality, even if they be only few in number, ought to be in touch the one with the other, and assist one another in such matters as spraying and the like wherever necessary. My ideal would be to see ten, twenty or fifty farmers in a neighborhood meet together and form a "co-operative society," each one agreeing to plant within the next five years ten acres of orchard, the varieties to be few in number and all suited for shipment, to properly study and carry out the care of their trees, and when the time should come for fruit bearing to unite in sending their apples forward under their own brand to the English market, having their evaporator for the windfalls, and if necessary their central frost and heat-proof storehouse at the central shipping point.

FERTILIZATION OF FLOWERS IN ORCHARDS AND VINEYARDS.

The PRESIDENT: I will now call upon Prof. Beach, horticulturist of the Geneva Experiment Station, New York.

Prof. BEACH said: I am happy to bring you greetings from our Experiment Station. We know something of your work at Ottawa, and in the United States Prof. Craig has an enviable reputation as being eminently qualified for the position he occupies. We also know something of your work through the excellent publication edited by your secretary, "The Canadian Horticulturist." It comes regularly to our table and keeps us regularly informed as to the lines of work that you are engaged in. In the line of economic entomology we feel that we get almost as much good in the United States out of the work of your "Canadian Entomologist" as you do yourselves. And then as to your own personal work, I had the pleasure of seeing in Chicago the magnificent exhibit which you made of apples there in the fall—an exhibit which, if I remember correctly, not only filled all space which was allotted to you but also overflowed into that which should have been occupied by the North-West Territories, and it was indeed a magnificent exhibit—one that you may well be proud of.

It is a matter of common observation among fruit growers that certain varieties of orchard and vineyard fruits show a remarkable difference in productiveness in different locations without sufficient apparent reasons for such a difference. I have in mind an apple orchard, fifty or more acres in extent, set chiefly to blocks of Baldwin and Greening, each block containing but a single variety in the main part of the orchard, but mingled somewhat with other varieties in one section. The orchard has been set about twenty-five years and has been a disappointment to its owners because, although it usually bears some fruit each year, it has produced but three or four good crops in all its history. In the section where varieties are mingled with the Baldwins they have borne much more satisfactorily than have either the Baldwins or Greenings where they stand in blocks alone. The trees around the edge are thriftier and bear better than they do in the central portion of the orchard. In fact, the central portion of the orchard has never yet produced a good crop of fruit.

The owners think the trouble may be due to a combination of causes. The trees are planted but thirty feet apart which is too close for mature trees. The soil in the central portion is thought to be naturally inferior to the soil in other sections. Hordes of insects have devastated some portions of the orchard and fungous diseases have not been wanting. While the orchard is not being impoverished by taking from it farm crops neither is it being manured nor cultivated. So far as spraying or pruning is concerned it receives much better treatment than most of the orchards in New York state. There seems to be good reason for believing that the trees are suffering from lack of nourishment due to crowding them too closely together on land not in a high state of fertility; to loss of foliage from insect pests and fungous diseases; to a lack of fertilizers, and to absence of cultivation. But there is no difference in treatment of different portions of the orchard so far as pruning, spraying, cultivation and fertilization of soil are concerned, and therefore the causes enumerated do not seem sufficient to satisfactorily account for the unproductiveness of varieties in certain sections while the same varieties in other portions of the orchard are comparatively productive. The unfruitful portions consist of separate blocks of Baldwins and Greenings unmixed with other varieties, and some have thought that possibly on account of this isolation of each variety the blossoms failed to set fruit.

A similar idea with regard to certain cultivated varieties of the native plum has long been entertained by some growers of that fruit in the Mississippi valley and other portions of the Great Central Plain. This idea is founded on observations that varieties such as Wild Goose and Miner set but little fruit when standing alone, although they blossom abundantly, while they are more productive when standing near other varieties from which their flowers may be assisted to set fruit.

Prof. Goff has shown* that with some kinds of native plums failure to set fruit may be partly due to imperfections in the flowers which render them incapable of set-

*Flowering and Fertilization of the Native Plum, *Garden and Forest*, vol. vii, 1894, pp. 262, 263.

ting fruit, but this does not account for those instances where a tree that was formerly barren becomes fruitful when another variety is planted near it. In such cases it appears that the flowers are capable of setting fruit, although they are incapable of setting fruit of themselves.

Some horticulturists have for many years believed that a similar condition of affairs also exists with certain cultivated grapes, especially with some of the hybrid varieties. Within the last three years I have been able to demonstrate that this belief is, in many instances, well founded. Mr. M. B. Waite of the U. S. Division of Vegetable Pathology, began a similar line of investigations in 1891 which resulted in showing that many varieties of pears, including some of the standard sorts, are incapable of setting fruit of themselves, a condition, so far as I am aware, that was wholly unsuspected by either practical or scientific horticulturists.

It appears, then, that in considering the unfruitfulness of grapes and pears a new factor must be taken into account, since it has been shown that a failure to fruit may sometimes be the result of the inability of the blossoms to set fruit of themselves. We have also seen that there is some reason for believing that this cause of unfruitfulness is not peculiar to pears and grapes only but that possibly it extends to other varieties of fruits as well. This brings us to the consideration of a subject that is coming more and more to be esteemed of great practical importance to fruit growing, namely, the fertilization of flowers in orchards and vineyards, especially in its relation to the production of fruit.

First it may be well to illustrate, or define briefly, the meaning of a few botanical terms which are convenient to use in a discussion of this subject.

In general the flowers of orchard and garden fruits are what botanists call perfect, that is, they contain both the male and female organs. The male organs produce an abundance of fine yellow powder called pollen. The female organs, called pistils, contain the rudimentary seeds. When the flowers open and the pistils are ready to receive the pollen, the end of the pistil becomes slightly moist and sticky, so that the pollen readily adheres to this portion of the pistil when it comes in contact with it. The pollen grains thus finding lodgment sprout and send out a minute tube which grows down into the central portion of the pistil till it reaches and fertilizes the rudimentary seeds contained therein. This is briefly the process of fertilization as that word is applied to flowers. After being fertilized, the rudimentary seeds begin to develop into seeds and the surrounding portions of the embryo fruit are thereupon incited into growth. On the contrary, if the pistil is not supplied with pollen it soon withers and no fruit is formed. In this connection it is not necessary to consider those unusual cases where fruit is developed without the action of pollen.

As stated before, for many years certain horticulturists have held the opinion that occasionally varieties of grapes were found in cultivation that were more prolific when standing in proximity to another variety that blossomed at the same time than they were when standing alone. In 1891 I planned to investigate this subject the following season and the investigations then begun have been continued every season since that time. As primarily planned the objects of the investigations was to determine if possible:

1. Whether the pistil of the grape flower is pollinated before the blossoms open.
2. Whether any varieties are incapable of setting fruit when supplied only with their own pollen.

Observations* on seventy-seven kinds of grapes, including eight species and their hybrids and crosses, showed that in every instance self-pollination occurred, so that with these varieties, at least, failure to set fruit could not be attributed to lack of pollination. Twenty-one of these seventy-seven kinds of grapes cannot fruit when supplied with none but their own pollen while they are able to set fruit when planted near other varieties that blossom with them. With these varieties failure to fruit must result when they are set by themselves out of the reach of pollen from other vines.

*Beach, S. A. The Self-Pollination of the Grape, *Garden and Forest* V., 1892, pp. 451-452; also Annual Report of N. Y. State Experiment Station, Geneva, N. Y., for 1892, pp. 597 to 606.

The second question, namely whether any varieties are incapable of setting fruit when supplied with none but their own pollen is evidently one to be fully decided only by experiment. Investigations concerning this subject were made by covering the blossom clusters with paper bags before the blossoms opened. The bag was slipped over the cluster and the mouth was then drawn together and fastened with a wired label. After the blossoming season had passed, the paper bags in some instances were replaced with bags made of cheese cloth or mosquito netting; in other cases the paper bags were allowed to remain till the fruit was gathered. It is apparent that all outside pollen was excluded from the covered clusters by the paper bags and whatever fruit set within the bags must have been the result of close fertilization, that is to say, the pollen necessary to fertilization of the flower must have been produced either by itself or by some other blossom in the same cluster.

Treated in this manner some varieties were able to fruit perfectly; other varieties failed to develop any fruit whatever, and between these two extremes there was every gradation. In order to present some of the results of these experiments in this paper an attempt has been made to classify the varieties according to their ability to set fruit.

Class I. Grapes which are fully self-fertile are named in the following table. By fully self-fertile is meant that so far as observed not more than three per cent of the blossoms fail to set fruit.

In this and the following tables the character of the stamens when known is indicated as follows: "s" indicates that the stamens are short: "l" that they are long: those intermediate between these two classes are mentioned in a foot note. Where self pollination before the blossom opens has been observed this is indicated by a *. The classification is based wholly on the evidence of my experiments. Further testing is considered necessary to determine the classification of varieties marked with a question mark.

Character of stamens.	Self-pollination.	Name.	Name of parent.	Parentage.
l	*	Ambrosia	Salem	Vin. and Lab.
l		Campbell	Triumph	Lab. and vin.
l		Croton	Delaware x Chas. de Fontainebleau...	Vin. and Bourq. and Lab.
l	*	Delaware		Bourq. and Lab.
l	*	Diamond	Concord x Iona	Lab.
l	*	Etta	Elvira	Lab. and vul.
l	*	Herald		Lab. (or Lab. x).
l		Janesville		Lab. and vul.
l	*	Lady Washington	Concord x Allen's Hybrid	Lab. and vin.
l		Mabel ?	Walter	Lab. and Bourq.
l		Mary's Favorite	Delaware x ?	Lab. and Bourq. (and vin ?).
l		Metternich	Clinton x Poughkeepsie's Red	Vul. and Lab. and (Bourq.?).
l		Monroe		Lab. and ?
l	*	Moore's Early	Concord	Lab.
l	*	Niagara	Concord x Cassady	Lab. x (vin. ?).
l		Opal	Lindley	Lab. and vin.
l	*	Poughkeepsie Red	Iona x Delaware or Walter	Lab. and (Bourq. ?).
l	*	Prentiss	Isabella	Lab.
l	*	Profitable	Elvira x Perkins	Lab. and vul.
l		Rochester		Lab. (or Lab. x ?).
l		Rogers No. 13	Chasselas x Mammoth	Vin. x Lab.
l		" 24	Bl. Hamburg x Mammoth	"
l		" 32	" "	"
l	*	Rutland		Lab. x (vin. ?).
l	*	Senasqua	Concord x Bl. Prince	Lab. x vin.
l	*	Vitis aestivalis		Aest.
l	*	Winchell		Lab.

Total, 27; 100 per cent. with long stamens.

CLASS II. Grapes which are partly self-fertile but still practically capable of fruiting satisfactorily alone are named in the following list :

Character of stamens.	Self-pollination.	Name.	Name of parent.	Parentage.
	*	Agawam, Rog. 15	Bl. Hamburg x Mammoth	Vin. x Lab.
l		Alice		Lab.
l		Brilliant ?	Lindley x Delaware	Lab. and vin. (and Bourq.?).
l		Burrows No. 42c	Concord x Jefferson	Lab.
l	*	Catawba		"
l	*	Caywood No. 50		"
l	*	Centennial	Eumelan	Lab. and vin.
l	*	Clinton		Vulp.
l	*	Concord		Lab.
l	*	Cottage ?	Concord	"
l		Diana ?	Catawba	"
l	*	Early Market ?	Elvira	Lab. and vul.
l		Elsinburg		Aest.
l	*	Elvicand	Elvira x Candicans	Cand. and vul. and Lab.
l	*	Elvira	Taylor	Vul. and Lab.
l	*	Empire State	Hartford x Clinton	Vul. p x Lab.
l		Golden Grain	Lindley x Del	Lab. and vin. (and Bourq.?).
l	*	Hartford		Lab.
l	*	Highland	Concord x Jura Muscat	Lab. x vin.
l		Hopican		Lab. and vin.
l	*	Isabella		Lab.
l	*	Iona	Catawba	"
l	*	Jefferson	Concord x Iona	"
l		Jessica		"
l	*	Little Blue		Lab. (or Lab. x ?).
l		Mills	Muscat Hamburg x Creveling	Vin. and aest.
l	*	Olita	Delaware	(Lab. and Bourq.?)
l		Paragon		Lab. (or Lab. x ?).
l	*	Pocklington ?	Concord	"
l		Rommel	Elvira x Triumph	Lab. and vin. and vul.
l		Standard	Delaware	(Lab. and Bourq.?)
l	*	Triumph	Concord x Chasselas Musque	Lab. x vin.
l		Ulster ?	Catawba x aestivalis	Lab. x aest.
l	*	Vergennes		"
l	*	Worden	Concord	"

Total, 35 ; character of stamens of Triumph, unknown ; otherwise, 100 per cent. long stamens.

CLASS III. Grapes which are partly self-fertile but set fruit unsatisfactorily when alone are named in the following list :

l	*	Adirondack		Lab.
s	*	Amber Queen	Marion x Bl. Hamburg	Vul. x vin.
l		August Giant ?	Black Hamb. x Marion	Vin. x vul.
s	*	Beagle	Elvira x Ives	Lab. and vul.
l	*	Canada	Clinton x Bl. St. Peters	Vul. x vin.
l	*	Canonicus		Lab. and vul.
l		Daisy	Goethe	Lab. and vin.
l		Dracut Amber		Lab.
l	*	Duchess	Wh. Concord x Del. or Walter	Lab. and (Bourq. ?).
s	*	Eumelan		(Lab. and vin.?)
l	*	Geneva	Wild Lab. x Mus. Alexa. x Iona	Lab. and vin.
l	*	Nectar	Concord x Delaware	Lab. and (Bourq. ?).
l		Noah ?	Taylor	Vul. and Lab.
l		Perkins		Lab.
l		Vitis Arizonica		Arizonica.
s		Vitis rupestris		Rupestris.
s		Vitis Solonis var.		Solonis var N. M.
s	*	Novo Mexicana		Solonis.
s	*	Vitis Solonis		Solonis.

Total, 18 ; 66 $\frac{2}{3}$ per cent. have long stamens, and 33.3 per cent. short stamens.

Of the 79 varieties of known stamens fruitful to some extent when standing alone, less than 8 per cent. have short stamens, and all these short stamen varieties are included in the list on this page. Three of them are wild vines, and three are cultivated.

CLASS IV. Grapes which are abortive fruit but do not perfect fruit when alone :

Character of stamens.	Self-pollination.	Name.	Name of parent.	Parentage.
s	..*	Aminia, Rog. 39.....	Bl. Hamburg x Mammoth.....	Vin. x Lab.
s	..*	Black Eagle.....	.....	Lab. x vin.
s	..*	Brighton.....	Concord x Diana Hamburg.....	Lab. and vin.
s	..*	Essex, Rog. 41.....	Bl. Hamburg x Mammoth.....	Vin. x Lab.
s	..*	Gaertner, Rog. 14.....	Chasseias x Mammoth.....	"
s	..*	Herbert, " 44.....	Bl. Hamburg x Mammoth.....	"
s	..*	Massasoit, " 3.....	Chasselas x Mammoth.....	"
s	..*	Merrimack, " 19.....	Bl. Hamburg x Mammoth.....	"
s	..*	Requa, " 28.....	".....	"
s	..*	Roger's No. 5.....	Chasselas x Mammoth.....	"
s	..*	Salem, Rog. 53.....	Bl. Hamburg x Mammoth.....	"
s	..*	Vitis cinerea.....	.....	Cinerea.
s	..*	Vitis Doaniana.....	.....	Doaniana.
s	..*	Wilder, Rog. 4.....	Chasselas x Mammoth.....	Vin. x Lab.

Total, 14 ; of the thirteen varieties in this list with known stamens, twelve or 92 per cent. have short or recurved stamens ; 2 intermediate recurved.

CLASS V. Grapes in which self-pollination had no perceptible influence on the ovary :

l	..*	Aledo.....	Taylor.....	Vul. and Lab.
l	..*	Amber.....	Bl. Hamburg x Mammoth.....	Vin. x Lab.
s	..*	Barry, Rog. 43.....	Elvira x Triumph.....	Lab. and vin. and vul.
s	..*	Blanco.....	Hartford x Bl. Hamb.....	Lab. x vin.
s	..*	Burnet.....	.....	Bourq. ?
s	..*	Clevener.....	.....	Vin. and aest.
s	..*	Creveling.....	.....	Lab.
l	..*	Eaton.....	Concord.....	Lab. and vin.
s	..*	Eldorado.....	Conc. x Allen's Hybd.....	Vul. and Lab.
2	..*	Elvibach.....	Elvira x Bacchus.....	"
l	..*	Faith.....	Taylor.....	"
l	..*	Hayes.....	Concord.....	Lab.
s	..*	Hercules.....	A. Rog. Hybrid.....	Lab. and vin.
s	..*	Jewel.....	Delaware.....	(Lab. and Bourq.?)
l	..*	Lady.....	Concord.....	Lab.
s	..*	Lindley, Rog. 9.....	Chasselas x Mammoth.....	Vin. x Lab.
s	..*	Marion.....	.....	Vul.
l	..*	Maxatawney.....	.....	Lab.
s	..*	Norwood.....	.....	"
s	..*	Red Bird.....	Lindley x Champion.....	Lab. and vin.
s	..*	Red Eagle.....	Bl. Eagle.....	"
s	..*	Roscoe.....	Del. x Martha.....	Lab. and (Bourq.?).
s	..*	Vitis Champini.....	.....	Champini.

Total, 23 ; seven or 30 per cent. of the above list have long stamens, and sixteen or 70 per cent. have short or recurved stamens ; 2 recurved.

These lists contain in all the names of one hundred and seventeen grapes, twenty-seven of which are fully self-fertile ; thirty-five are partly self-fertile but are able to fruit satisfactorily of themselves ; eighteen are partly self-fertile and fruit unsatisfactorily of themselves ; fourteen have pollen self-irritant only, and twenty-three show no appreciable development of the ovary as a result of self-fertilization.

For all practical purposes the varieties may be placed in three groups. The first group, including Classes I and II, contains those kinds which are able to fruit satisfactorily when standing alone. Of the one hundred and seventeen varieties mentioned in the preceding lists sixty-two, or a little more than one-half, are able to fruit satisfactorily

when standing alone. The character of the stamens has been observed with sixty-one of these self-fertile varieties and in every instance the stamens are long. In this group are found among many others the following well-known kinds: Agawam, Catawba, Clinton, Concord, Delaware, Diamond, Diana, Elvira, Hartford, Isabella, Moore's Early, Niagara, Pocklington and Worden; and also Brilliant, Elvicand, Mills, Triumph and Winchell of the newer kinds.

The second group, identical with Class III in the preceding lists, contains those varieties which are able to set some fruit, but when standing alone yield clusters that are imperfect and unsatisfactory. This group includes among others Beagle, Canada, Duchess and Eumelan.

The third group, including Classes IV and V, contains those varieties which when self-fertilized did not bring a single fruit to perfection. In it are found among other kinds Barry, Black Eagle, Brighton, Eldorado, Massasoit, Merrimack, Lindley, Salem and Wilder. Nearly all the varieties in this and the next preceding group are hybrids, but some are not. It will not do, however, to reason from this that hybrids cannot bear fruit when self-fertilized, because two-thirds of the first group are hybrids. Neither are we prepared to say that all cultivated varieties belonging purely to one species are able to fertilize themselves, since some few varieties that are not commonly thought to be hybrids cannot fruit alone.

Rarely have varieties with short stamens been found that were able to set any fruit of themselves, and even then the clusters were very imperfect. Prof. Munson holds* that in all species of *Vitis* wild vines having flowers with short recurved stamens are incapable of setting fruit of themselves.

While it would not be well to accept results of observations on but an hundred and seventeen varieties in one locality as conclusive for all varieties and localities yet the observations are on a sufficiently extensive scale to be valuable in indicating what results may be expected from wider observations. They indicate that :

1. Only cultivated varieties of grapes having long stamens may be expected to fruit satisfactorily by themselves.
2. Not all varieties with long stamens are able to fruit satisfactorily by themselves.
3. Varieties having short or recurved stamens, and other self-sterile sorts if grown at all ought to be intermingled with other vines that blossom at the same period.
4. Most of the varieties incapable of setting fruit of themselves are hybrids.
5. Many hybrids are capable of setting fruit satisfactorily of themselves.
6. The failure of grapes to set fruit of themselves, so far as may be determined from these investigations, is not for lack of pollination. Observations have been made on thirty-one of the fifty-five varieties which were noted as setting fruit of themselves unsatisfactorily or not at all and in every instance self-pollination occurred before the blossoms opened.
7. Blossoms which are not incited to develop fruit by the action of their own pollen may fruit satisfactorily when supplied with pollen of some other variety. This is shown not only by experiments where the blossoms of such varieties were hand pollinated with pollen from some other variety, but also by abundant evidence of their fruiting in mixed vineyards where they are exposed to the access of pollen from other varieties. Thus Barry, Eaton, Eldorado, Lindley, Brighton, Black Eagle, Gaertner, Herbert, Merrimack, Salem and Wilder proved in these experiments utterly incapable of perfecting fruit when supplied only with their own pollen, yet they are quite generally valued as amateur varieties and some of them are occasionally planted in commercial vineyards.

The experiments of Mr. Waite with pear flowers have already been referred to. They were undertaken in the spring of 1891 for the purpose of ascertaining the value to pear flowers of insect visitors and the work of that season brought out the fact that the trees experimented with were† divided sharply into two classes, those which would fertil-

*Beach, S. A. Notes on Self-Pollination of the Grape. Annual report, N. Y. Agricultural Experiment Station, Geneva, N. Y., 1892, p. 604.

†Pollination of Pear Flowers: Bul. 5, U. S. Div. of Vegetable Pathology, Washington, D. C., 1894, p. 20.

ize their own blossoms and those which could not. During the following year he carried on extensive investigations concerning the ability of cultivated pears to set fruit of themselves. These investigations, pursued in widely separated localities, showed that some of the best known and most widely cultivated varieties of pears were wholly or partly incapable of setting fruit of themselves. The limits of this paper will not permit his careful methods to be presented in detail. As a result of his investigations he has prepared the following lists.

Self-fertile varieties : Angouleme, Bosc, Brockworth, Buffum, Diel, Doyenne d'Alencon, Flemish Beauty, Heathcote, Kieffer, Leconte, Manning's Elizabeth, Seckel, Tyson, White Doyenne.

Self-sterile varieties : Anjou, Bartlett, Boussock, Clairegeau, Clapp's Favorite, Columbia, De la Chene, Doyenne Sieulle, Easter, Gansel's Bergamotte, Gray Doyenne, Howell, Jones, Lawrence, Louise Bonne de Jersey, Mount Vernon, Pound, Sheldon, Souvenir du Congres, Superfin, Wilder, Winter Nelis.

Both in Mr. Waite's investigations with pears and in my investigations with grapes it has been shown that although a pistil may be plentifully supplied with pollen from its own blossom yet in self-sterile varieties no fruit is developed as a result of such pollination. In other species of plants similar instances have long been known. In such cases unfruitfulness is not due to a lack of pollen but to a lack of a right kind of pollen. In many observed instances when the pistils of self-sterile plants are supplied with pollen from some other variety of the same species, or even of some nearly related species, fruit is produced.

Another interesting fact is that the pollen which is powerless to incite fruitfulness on flowers of its own variety may be able to fertilize the blossoms of some other variety. I have had currants develop fruit when the pistil was supplied only with gooseberry pollen and vice versa, and pears when supplied only with apple pollen ; others have reported that peach blossoms set fruit when supplied only with cherry pollen. These may be considered rather extreme cases and in such instances the resulting fruits are apt to be seedless. More nearly related species, as, for example, the different species of grapes or the different species of gooseberries, produce seeds quite readily when fertilized by each other in this way.

Evidently the fruitfulness of a self-sterile variety may be accounted for by the proximity of a supply of congenial pollen, even though it be produced by a plant not of the same but of some nearly related species, so that, while the production of fruit depends on a supply of congenial pollen, that supply does not always come from blossoms of its own variety but may come from other varieties or even from other species.

From what has been said it ought not to be inferred that in all instances where trees are unfruitful when standing alone the difficulty is due to lack of congenial pollen for fertilizing their blossoms. It would be easy, for example, to show that many varieties of fruit are less productive when standing alone than when mingled with other varieties in a well cultivated orchard, but this does not necessarily prove that the reason for its unfruitfulness when isolated is for lack of proper pollination of its blossoms, for it usually happens that it has much better care in the orchard where it becomes someone's business to look after its welfare than it has when standing alone where it is apt to be somewhat neglected. In making comparisons of this kind all conditions which may influence the fruitfulness of the plant ought to be carefully considered and conclusions drawn only from carefully conducted experiments.

In conclusion let it be stated that this essay is intended simply as a contribution to our knowledge of the fertilization of flowers in orchards and vineyards, a subject concerning which we as yet know very little, but which opens before us a wide field for investigation, and which promises results of very great practical importance to horticulture. It was shown in the introduction to this paper that there are reasons for suspecting that the same conditions may be found with some other kinds of orchard fruit which are known to exist with pears and grapes, namely : That some varieties are unable to set fruit at all, or only imperfectly, when standing alone. Here is suggested a most interesting line of experiments to which it is hoped that horticulturists will soon give the attention it deserves. Since it is true that some varieties of fruits come

into favor when grown in mixed plantations but bring loss and disappointment when on the basis of such records they are set in extensive plantations unmixed with other varieties, then, before setting large plantations of a single variety it is the part of wisdom to determine whether or not that variety can fruit satisfactorily of itself.

On the other hand the knowledge that lack of cross pollination in certain instances is sufficient cause for unfruitfulness should not make us hasten to attribute to it all instances of unfruitfulness that have vexed our souls and lightened our purses in years past, making of it a scape-goat which we solemnly send away to the wilderness after laying all our sins of omission and commission on its devoted head. Knowing this as a possible cause of unfruitfulness we should be none the less careful to employ all the other means conducive to the development of vigorous, fruitful plants, which the science and art of horticulture have placed at our command, such as a study of the adaptability of different varieties to different soils and climates; the cultivation and fertilization of the soil, pruning, thinning the fruit, and spraying for the prevention of fungous diseases or for the destruction of insect pests.

The SECRETARY: I think this is one of the most valuable papers that we shall have to place within our records, and I wish, before we proceed to discuss it, to move a most hearty vote of thanks to our friend Prof. Beach, who has come to us from the New York State Experiment Station, Geneva, to give us this paper. I am very glad indeed that Prof. Craig suggested to me the advisability of asking him to come, and I at once responded, because I had heard Prof. Beach at the Western New York Horticultural Society on subjects allied to the one he has just dealt with.

Mr. BEADLE seconded the motion, which was carried amid applause.

The PRESIDENT tendered the vote of thanks to Prof. Beach, who said it was a pleasure to be here, as he always learned more at such meetings than he brought to them.

The SECRETARY: With regard to the Baldwin apple, have you ever investigated the flower of this apple whether it was self-pollinating or not? In New York State the Baldwin has not been so productive for ten years past as it used to be. They used to recommend a person who wanted to know what to plant, "Plant 99 Baldwins out of 100"; and when asked about the other hundredth the answer would be, "For the hundredth plant another Baldwin." In the vicinity of Grimsby there are large orchards of Baldwins that have not produced fruit for ten years past, and I would like to know whether this is the difficulty—whether it is a variety that is not self-fertilizing.

Prof. BEACH: I wish I could answer the question, but I cannot. I know some investigations have been made with Baldwins, but not sufficient to enable us to speak with any degree of certainty in regard to them—not enough to be sure that it is the only cause. Of course we know that there are other reasons for inducing unfruitfulness in trees, and in my opinion, throughout Western New York, trees are crowded too closely together for one thing. They set trees about thirty feet apart, and the air cannot circulate; and they crop the orchards to some farm crop and put them on ground that their fathers before them had taken farm crops from for years and years, and they find that they cannot get the crops off because the land is impoverished. This opens before us one of the widest fields of investigation of any subject which I am acquainted with just now of practical importance to the horticulturist. A man does not like to spend the time to carry on these investigations himself, and I think our experiment stations ought to be equipped with sufficient money and a man who can devote his time to it to carry on just such investigations as that. I do not know of any one that can answer the question.

Mr. PATTISON: I have been very much puzzled with one of the Chickasaw varieties, and that is the Weaver. I had one standing among other plums, that is to say more cultivated varieties, and those trees, while making very fine growth and setting a very heavy blossom, refused to bear. I have thought that the reason was that they needed another of the Chickasaw variety to fertilize those. They don't blossom at the same time as the other plums. Would that account for it?

Prof. BEACH: I am of opinion that that is right. In our orchard we have a number of varieties of the Americana, and the other native species, and they set fruit quite heavily;

our trees are usually loaded ; and yet your experience is one that we are quite apt to have where the trees are alone with some of our native sorts ; and I should expect that if you would set with them some native variety that blossoms at the same time they would produce fruit, although I cannot answer with certainty in regard to it. I should expect that plums of the domestic class would be able to fertilize.

Prof. HUTT : What would Prof. Beach recommend to fruit growers who have made the mistake of setting one variety of trees, or planting one variety of vines ?

Prof. BEACH : I should first make sure that they needed a supply of pollen—because we have fifty chances out of one hundred that they are all right—but if I was sure they needed a supply of summer pollen, I would graft or bud some other varieties in with them. If your orchards are set all right, you cannot crowd in another row of trees very well, and I don't see any other way out of it except to graft or bud or branch other trees in. The insects will help a great deal in the distribution of pollen.

Prof. HUTT : Wouldn't it be well if fruit growers kept bees ? I do not believe there are enough wild bees to effectually fertilize as well as it should be.

Mr. ORR : Is the Vergennes a self-fertilizing grape ?

Prof. BEACH : The Vergennes comes in a class that is able to set very satisfactorily, but is not perfectly self-fertilizing, that is to say, a cluster would not have every one maturing, but it would be satisfactory.

Mr. ORR : Can you say what varieties should be planted in the block with that ?

Prof. BEACH : Most any other variety that would blossom at the same time, but you would find that Vergennes would set fruit satisfactorily of itself, although it comes into what I call the second class.

Mr. PATTISON : Is it not the case that even where they are self-fertilizing the quality of the fruit is improved by the alternate setting, or setting in close juxtaposition ?

Prof. BEACH : Have you had any experience of that kind ?

Mr. PATTISON : I have always adopted that plan myself, but I have not had sufficient experience to be certain of it.

Prof. BEACH : I think you better call for expressions of opinion from others in the audience. So far as I know there is no influence of the pollen on the quality of the fruit, if that is what you mean. The only way can be that different varieties set close together might take slightly different materials from the soil, and that they would have a better chance in that way—that is, they could not be so closely crowded for food.

Mr. BEADLE : The experiments made by Mr. Waite to which Prof. Beach referred are well worthy of study, and I presume his report can be easily obtained by writing to our Secretary. There he goes into the matter of how far in the course of his experiments he has thought that the pollen of different varieties of pear affected the size, appearance and perhaps in a certain sense the quality of fruit. They are the first experiments I have seen that throw any light upon that question which has been asked during the last half century. I sent the Secretary Prof. Waite's list of apples and pears so far as he has gone, in which he sets forth how many are self-fertile and how many are not self-fertile. That list was published in the *Horticulturist* last year.

Prof. BEACH : Of course I had that question in mind in examining the fruits where I had done cross fertilizing, and I must confess that in the grapes I never could detect any immediate influence of the pollen on the fruit ; but I saw the same pears in Mr. Waite's experiments, and there was a plain difference, which is set forth to some extent by the photographs in the article which Mr. Beadle has referred to, published by the Department ; and I may say that not only are the publications of the Department at Washington to be had for the asking, but if any of you care for the bulletins of the Geneva Station, you can doubtless get them by writing to the Director at Geneva, N.Y., and asking to have your name put on the bulletin list.

Mr. WHITE : Every grape grower should have heard the address this afternoon. It is a thing that has puzzled most people who have plenty of grape vines, to know how it is

that they haven't taken a crop of grapes while others have succeeded. I have a Brighton vine that bore a heavy crop with fine large bunches in one place, and another part of the vine it was a thin bunch and a small crop; and it was the same with most of the grapes mentioned by Prof. Beach. I know a man who grows the Agawam in a large bunch of perfectly set fruit. I know another place where the Creveling is grown in the same way, whereas with me the Creveling was a failure, and I know now it was set in a place where it didn't get pollen from other varieties. Another influence is the proper fertilizing of the soil. I have noticed in some varieties they were getting worse and worse all the time. In a garden the next block to my place two or three years ago the owner showed bunches of Brightons about ten inches long and of proportionate width of most beautiful grapes. I never knew anybody else grow such bunches of Brightons, and on going to his garden I found he had fertilized to an enormous extent; he had got an opportunity of getting a large lot of stable manure at a low price and he laid it on thick, and I was satisfied that that was the cause of those large bunches of grapes.

Prof. BEACH: I think there is no doubt that that is true. This question of pollination does not explain all failures to set fruit. You will find that plants which are in a good state of vigor are able to set fruit more abundantly; of course, leaving out of the question a state when they are in that active growth of young plants when they are not in bearing; but after you have got them so that they will bear a good crop, then plants that are in a good vigorous condition will, I believe, set fruit more abundantly and give you more of it than plants that are in a weaker condition.

Mr. WHITE: Does the actual fertilization produce pollen in a vine that would not otherwise have the pollen?

Prof. BEACH: I don't think it is a question of pollen or not, but I think it is a question of the whole system or being. The value is not in the pollen, but simply that the pollen does not have an effect on its own pistil. Sometimes you will see varieties which seem to naturally set very well, and others which do not set very well; and there is something about the natural tendency of the variety as to whether they will set fruit well or not, and the condition of them, with other causes, will affect the vine or plant. I had a fine Eldorado crop this year, and the buds all fell off before they opened, so that although the Eldorado is not able to set fruit of itself, I could not lay it to that or the lack of pollen even. These veteran horticulturists here that have had years of observation and experience would be able to answer this question better than I. What do you think about that, Dr. Beadle?

Mr. BEADLE: I have not experimented with the Brighton grape in that direction; but I have just noticed this change, that there are years when the Brighton would seem to set its fruit much more perfectly than in other seasons. I suppose I have taken it from what I have read more than from any personal observations—you know that a busy person in cultivating season cannot carry out experiments of this nicety very well—but I had supposed that the most of the trouble with the Brighton is with the stamens: they do not rise up and become erect, but they are re-curved, consequently the pollen cannot get on to the pistils unless some insects happen to carry it there. I have noticed that in some seasons my Brighton grape vines would set their fruit better than in other seasons, whatever the cause may be. It may have been that the plant was in such vigorous condition that the stamen would stand upright and allow the pollen to reach the pistils.

PLUM GROWING ON THE SOUTH SHORE OF THE GEORGIAN BAY.

The Secretary read the following paper by Dr. AYLESWORTH, of Collingwood, on the above subject.

It was a surprise to me when I received a letter from your secretary asking me to read a paper before this meeting of the association, for prior to that time it had never entered my head that I had anything to communicate that would interest such veteran

fruit growers as many of you are. He suggested as my subject, "Plum Growing on the South Shore of Georgian Bay," overlooking the facts that this shore extends, including inlets, at least 100 miles and that my parish is not co-extensive. Portions of this shore, such as the Beaver Valley, have already demonstrated their adaptability to the growth of apples and plums and I have no doubt the whole southern coast-line is so adapted. But my personal experience and knowledge is confined to the neighborhood of Collingwood which is near the eastern extremity of this shore line, and as I wish any information I may be able to give to be reliable, I will confine my remarks to its neighborhood, say a radius of from five to fifteen miles, of the town.

Twenty years ago I settled in Collingwood, and my father, who was already a resident, immediately began pointing out the high character and quality of the fruit that was being grown. The quantity of this fruit, however, was so small, that what fruit was consumed by those who did not grow it themselves had to be imported. These conditions resulted in my planting the first commercial orchard in that section, consisting of 50 pears, 600 plums and 1,000 apple trees. I had the usual experience of pioneers and saw many and heard of more wise heads wagging at my rashness.

The full information so freely given, and so widely distributed in the earlier reports of this association, saved me many mistakes which I would have otherwise added to those I did make. And I would like to express here the high appreciation I have of the work done in developing fruit culture in Ontario by this association. Some six or seven years after planting I had a large crop of plums, and the fabulous stories of my profits (the largest I heard of being \$9,000 for the season) caused the wagging heads of the wise-aces to take a different direction and induced many to plant trees; until now there are a number of orchards as large as mine besides many smaller ones. The planting continues with an increasing ratio unto this day, so that the number of trees that will come into bearing each year in the future will be very great.

Within ten years the first carload of apples was shipped from Collingwood and the quantities of plums were very small indeed, if any.

The quantity of apples shipped now by local dealers and growers within the above radius is about 12,000 barrels, while foreign buyers probably take care of about as many more, say 20,000 barrels in all at the least. Local dealers and growers ship about 17,000 baskets of plums, and from stations within the above radius enough more is shipped to make 20,000 baskets. As yet very few pears are shipped; I am, perhaps, the largest individual grower, having 50 trees in full bearing and 200 more just beginning. There are not enough peaches grown for home consumption yet. Neither are there enough grapes and small fruits grown for home consumption unless it be strawberries.

Within ten years the quantities of fruit produced will be quadrupled, or 80,000 barrels of apples and 80,000 baskets of plums, besides indefinite quantities of peaches, pears, apricots and small fruits, for pears are already going to the north shore of the bay and home-grown peaches and apricots have ceased to be a novelty. There is one pear orchard of 700 trees and several peach orchards of 200 trees planted already.

It must be understood that the fruit belt does not cover the whole country for, for the best success, you must plant between the line where the water of Georgian Bay ceases to modify the effects of the high latitude, and the water.

The distance this line extends inland varies much, where the highland or central plateau of Ontario (some places 900 ft. above the bay) comes close to the water this line may be within a mile of the shore, but where lower lands or valleys debouch upon the bay this line retires in places as much as fifteen miles from the shore. I mean by this that there is a strip of fruit land from one to fifteen miles wide adjoining the water, and in length about one hundred miles. This paper is confining itself to the extreme eastern ten miles of this strip.

The conclusions I have reached from my own experience and observation are:

1. That any kind of apple that can be grown anywhere can be grown in this section and brought to a perfection impossible further south. I have from my own orchard filled a barrel full enough to ship with 108 specimens of Northern Spy apple, some of them weighing between 19 and 20 ounces.

Lest this seemingly fabulous story should cause my veracity to be questioned I would point out that if the apples in this barrel had weighed the usual 135 pounds it would have necessitated their averaging 20 ounces. But when the air space is deducted in a barrel of apples of that size they did not average over 18 ounces.

2. Any kind of plum grown any where can be grown here and brought to the greatest perfection.

3. Any of the less tender varieties of pears grown in Ontario can be grown here to perfection unless it be some of the late winter pears, which will in some years find the season too short to ripen thoroughly. The most of the trees I have planted are of three varieties, Clapp's Favorite, Flemish Beauty and Bartlett. But I have fruited the three that are marked the highest on the list in your last report, the Anjou, Bartlett and Sheldon, and have had not the slightest trouble in perfecting them. I have been competing successfully with the California pears in the Winnipeg market for several years.

4. In the past, want of faith in the climate has prevented the peach from being planted, and most of the fruit produced has been seedlings. But some growers are now planting quite extensively and no doubt in a few years the peach crop of this section will have to be taken account of. I have Early Crawford peaches planted some five years and fruiting three years and have yet to find a twig injured by the climate.

5. Grapes I have no personal experience with, but a reliable friend assures me of the correctness of the list given below from his experience.

We are honored by a special division for grapes in your report known as the Lake Shore division, and my friend objects strongly to the list given, and would substitute the following, all of which he has grown successfully :

Black—Concord, Creveling, Wilder, Worden.

Red—Agawam, Delaware, Brighton, Lindley and Salem.

White—Moore's Diamond, Niagara and Green Mountain.

Grapes can be produced in great profusion, but owing to their being later than those produced south, when ripe the price is very low ; I have no doubt that this has prevented others, as it has myself, from planting for market. But as northern Ontario opens up, our proximity gives grape growing on Georgian Bay a future.

After enquiring diligently among those I knew had devoted most attention to the growth of small fruits I have been unable to learn of any that had had a failure from climatic causes.

The soil varies from a light sand to the heaviest clay, so that the favorite soil of any given fruit can be selected. I firmly believe this fruit belt will rival the Niagara Peninsula as a fruit country in the near future.

Fifteen years ago fruits and fruit trees had no enemies, but now we have nearly all that the more highly civilized regions boast of, but I am fully persuaded that they are not nearly so virulent as in warmer climates. Though the black-knot has been introduced and gained considerable headway, a little energy on the part of the inspectors has caused its diminution instead of its increase, and it now seems quite under control.

Fifteen years ago all kinds of fruits came to market in all kinds of boxes, barrels, baskets and bags. But to-day things are different and I think we will soon equal the best in the care bestowed upon our fruit.

Collingwood as a shipping point for fruit is unrivalled, as the two fleets of steamers with their headquarters there bring to our doors all the north and west where fruit cannot be grown, and the completion of the Parry Sound Ry. will give us direct communication with the whole of northern Ontario and Quebec. So that this section has the greatest advantages on account of its proximity to the best markets of our own country and the western States, while freight rates to England are no more than from southern Ontario.

Remembering our latitude many of the foregoing statements may seem fabulous, nevertheless they are true, and are not only true but are consistent with all the facts known to science concerning climatic conditions and the growth of fruit. Perhaps the most convincing way to put the subject in the few moments at my disposal will be to take a general view of Ontario and New York State. Southern New York, as well as Pennsylvania is mountainous and miles from a large body of water, and there is no

intense excitement about its great adaptability to fruit growing in that section. Portions of central New York and along the Hudson excel in this particular. But when you come still further north to Niagara county and its neighborhood you have the eastern paradise of the fruit grower of the northern States. Crossing the line you have the same conditions on the Peninsula between lakes Erie and Ontario.

The fruit regions follow the shores of the lakes, but it is not all the shores of each lake that are thus favored, for just as it is impossible to grow peaches on the north shore of Lake Ontario east of Toronto while its south shore is specially adapted to its production, so it is impossible to grow fruit on the north shore of Georgian Bay while its south shore seems well adapted to it; peaches being grown there with ease though seventy-five miles north of the north shore of Lake Ontario.

Most of this is trite to those who have given it attention, but there is one point never seen or heard mentioned, and as it is a practical one I would like to state it here, the more especially as I know most of you sympathize with my feeling of dissatisfaction, which has been much increased since our successes at the Columbian Exhibition, when I think our neighbors to the south are getting ahead of us in any useful art or calling.

A few moments ago I referred to the extreme adaptability of some portions of central New York to fruit growing, grapes being the chief specialty. The facts are that these favored sections occur on the margins of the smaller lakes with which central New York is studded. And the point I wish to make is that we have a lake very close to us here in Orillia, lake Simcoe, that should afford equal opportunities upon some parts of its shore to produce fine fruits in abundance.

Personally I have no doubt whatever that there are bonanzas in fruit growing around the shores of Lake Simcoe that only await experiment backed by intelligence and enterprise to enrich some men who I sincerely hope will be Canadians. For while glad to receive strangers it seems to me it would be humiliating to have them come in and pick up such plums (literally as well as figuratively) which we have been too stupid to see though living alongside of them all our lives.

PACKING FRUIT FOR EXPORT.

Mr. A. H. PETTIT read the report of the committee which had been asked to deal with the recommendations submitted by the Deputy Minister of Agriculture, as follows:

SUGGESTIONS FOR ACT *RE* PACKING FRUIT FOR EXPORT.

1. The name of the variety shall be stamped upon the barrel, and the class whether 1, 2, 3.
2. The classes (No. 1 and 2) shall be uniform throughout the barrel.
- 3 The packer shall put his name and address on all apples marked No. 1; and on No. 2 apples a brand by which they may be known as such.
4. The grades shall be those laid down in the Dominion Inspection Act, viz:

No. 1 inspected Canadian apples shall consist of well-grown specimens of one variety, of nearly uniform size, of good color, sound, free from scab, worm-holes and bruises, and properly packed.

No. 2 inspected Canadian apples shall consist of specimens of one variety, reasonably free from the defects mentioned in class No. 1, but which, on account of the inequality of size, lack of color, or other defects, could not be included in that class.

6. The size of the apple barrel shall be as follows: length of stave 28 inches; length of head, 16½ to 17 inches as laid down in the Statutes of the Dominion.

Mr. PETTIT moved the adoption of the report.

Mr. BOULTER seconded the adoption of the report.

The SECRETARY: This will be a dead letter until there is an inspector; but when there is an inspector whose business it is to seize and confiscate such fruit as is put up in a fraudulent manner, which is branded No. 1 when the barrels contain No. 2 or No. 3 apples, we shall expect to see some results of the position we are taking. However, I would approve of the report of the committee.

Mr. WHITE: This is a matter in which you ought to go slow. These recommendations ought to be printed and communicated to the members. It is a very serious thing to back out of a thing carried by a meeting. We should defer anything on a report of that kind asking change of legislation.

Mr. PETTIT: This is not a question of legislation at all; that is to come later on.

The SECRETARY: There is nothing in this but what we can heartily agree with.

The motion was carried.

COLD STORAGE IN FRUIT GROWING CENTRES.

Mr. A. H. PETTIT said: I received a copy of the programme but a very short time ago, with my name opposite this subject. I suppose the reason I was asked to deal with this question is that I have been giving the matter some little study, but I have not been able to arrive at the cost or anything to throw any light on that subject, but the point would appear to me like this: We are to-day in this Province of Ontario growing immense quantities of summer fruits. Of course at this cold season of the year it is not a very warm subject to discuss cold storage, but about July, August and September it would be a very pleasant subject to consider. Now, at that season of the year we have immense quantities of fruit as fine, I suppose, as grown in any country in the world. We find our own markets being well supplied at different seasons in the year with summer fruits. Now, why could we not, by establishing in local centres of fruit culture cold warehouses of some kind, make our country one continual summer of our choice summer fruits. The day of experiment I think in that direction is past. It has become an established fact I think, that we can keep almost any variety of our summer fruits over a certain period of time. Even our most perishable fruits might be kept a short time. Now, coming from a peach-growing section, I would illustrate one or two points in it which would be beneficial to our fruit growers. Take the one line of peaches alone, the early Crawfords, which are to-day the most largely grown in our section of the country in the peach line, and at that season of the year we place upon the market very large quantities, and the price is very much lower than that of many peaches of inferior quality simply for that reason. Now, if we can hold that market with cold storage even for a week or ten days, we can make a very large profit indeed. If we like we can hold our apples and summer pears, Bartletts, and those things, till the following summer, and we can have one continual flow of those summer fruits. Now, I do not wish to go too far upon this subject, because I have not had as much experience as someone else; but in the city of Chicago where I spent last summer in charge of the Fruit Department of Ontario, I visited a great many of the cold storage warehouses. In the hot month of May and June, you could go into those warehouses and see thousands of barrels of Canadian apples—Northern Spys—in prime condition bringing splendid prices in that market. Now, I think fruit growers by combining to establish cold storage warehouses and hold their fruit, could realize double what they are receiving to-day by shipping them all within six weeks to all the markets both home and foreign. We could thus make our business more profitable and satisfactory in every respect. Prof. Craig has been conducting experiments this year on the keeping qualities of the different kinds of fruits, and I want to ask him to finish the subject, for I know that he can do it more justice than I can. I believe that this is the great question of the day with sections of the country where fruit growing is engaged in to a large extent. (Hear, hear, and applause.)

The PRESIDENT: Prof. Craig, we would be very glad indeed to hear from you on the same subject.

Prof. CRAIG : I cannot add very much to what Mr. Pettit has already said. He has addressed you from the grower's standpoint, and I will give you very briefly some results of experiment work which I have conducted along this line during this season. When at Chicago last year, this phase of fruit culture struck me as one of the lines which should be investigated in favor of the fruit grower of Ontario ; and as soon as an opportunity occurred this season, when the fruits began to ripen, I made arrangements with a cold storage warehouse in Montreal—one of the best equipped of this kind that I know of—to ship there from time to time samples of our early summer apples. I began with Tetofsky, and continued taking in Duchess, Red Astrachan, Yellow Transparent and Wealthy and Colvert and so on, including a full list of the summer varieties as well as those less perishable of the fall kinds. I also included, just for information, some stone fruits, the early varieties of peaches, plums and pears, and fall pears. It is too soon yet to speak of results, that is their present condition in all cases which I have mentioned ; but I can at this point state quite definitely that I have had negative results in some cases which speak for themselves. For instance, in the case of early peaches, Mountain Rose and Early Crawford keep very well for a period of about eighteen days, after being kept in a uniform temperature of 35. Now that, it seems to me, would tide over any difficulty which might arise in the peach season from a glutted market. At the same time our experiments show that this stone fruit cannot be kept even at that temperature for any length of time—a fortnight probably would be a safe outside limit ; but our experiments only go this far, and too much weight should not be put on them. With regard to plums, our experience has been practically identical. We have been able to keep them a few days to over two weeks in good condition ; after that a kind of deterioration in quality—not exactly a decay—set in, so that while a plum was fairly intact in regard to shape and form and solidity of flesh, it had lost flavor and could not be sold as a plum of good quality. With regard to the early apples I may say that I examined them personally about ten days ago and found the Tetofsky in perfect condition, just as good when put in the cold storage, with the quality as good as you could have it—and as you know it is a very perishable apple which does not usually keep a week when taken from the tree if taken when fully ripe. I put the Tetofsky in about the 28th July, and the others as they ripened afterwards at that time. The Duchess it is needless to say was also in perfect condition, and so were all the other apples. In conducting this experiment I had duplicate packages prepared, in one of which the fruit was wrapped separately in tissue paper, and in the other it was merely packed in a basket without any wrapping. Where there was ever any indication of rotting it was in the package in which the fruit was not wrapped. This was very apparent in the pears. The Bartletts and Flemish Beauties were in perfect condition when I examined them ten days ago, and only to-day I have received a letter from the manager of the Cold Storage Company in which he says, "Having examined all the stock I may say generally that that stock which has been kept in wooden packages, not in baskets, has kept best. For instance the pears in the small barrel marked 'Pettit' are in good shape, while the pears that are in baskets are not in such good condition, about five per cent. of these being wasted. All the apples are in No. 1 condition."

A DELEGATE : Have you any data as to the cost of cold storage ?

Prof. CRAIG : I don't know how cheap a building could be put up that would answer the requirements of cold storage. I know this one where the experiments are being carried on for me is a very expensive one ; the plant in it cost \$35,000.

DELEGATE : It is something worth knowing about this cold storage when Tetofskys run down to 50c. or 40c. a barrel.

Mr. WHYTE : Wouldn't it be better to have these cold storage warehouses on the market, say at Toronto and Montreal ?

Prof. CRAIG : I think if the fruit is kept at the right temperature no change takes place, and that when the fruit is taken out it will take the same time in the process of decay as it would originally. I think it will keep just as long as it should after the fruit has been picked before it is thoroughly matured on the tree. It would be an advantage

to have the cold storage at the shipping point so that the fruit could be transferred without the possibility of a great change of temperature for any length of time.

Mr. A. H. PETTIT: I had apples on our table at the World's Fair for no less than six weeks after they came out of the cold storage, and that was in a very warm room, under glass you may say. New York State had apples for more than six weeks on their table after coming out of the cold storage. The course we took after taking them out of a temperature of 34 was to put them in a room that is just moderately warm, and there let the evaporation take place and the moisture pass off, and they seemed to keep splendidly. I was always opposed to cold storage on the ground that they would decay more rapidly, but experience tells us that they will not—they will keep exceedingly well if carefully taken out.

Mr. BOULTER: Has this Association any plans of a cold storage whereby any member could get information? I expect to build a cold storage in Toronto next summer and would like to get some information.

The PRESIDENT: I think there have been plans published in the "Horticulturist."

Prof. CRAIG: Not of the kind that we are discussing here.

Mr. BOULTER: I think it would be very beneficial if our "Horticulturist" could print or disseminate plans whereby members of the society could build small storage warehouses in different localities, because I believe that cold storage could be adopted in centres where it seems now almost impossible. I have lost thousands of dollars by not having cold storage for strawberries.

Mr. A. H. PETTIT: The only process I have seen has been a chemical process, and that can be regulated I think very much better than we can any ice storage.

Mr. MCNEILL: I have had a little experience in cold storage. I saw the construction of one and lived within thirty feet of it for eight years, and saw the workings of it during that time, in and out of it all the time, closely connected with some business that was going on there. This cold storage room was built by a dealer in butter and eggs and general produce for his own use. It had double walls on the outside with building paper between; two doors on the inside with paper between; and simply scantling, I think it was 2x10, between those. That is all the protection he had. It was not quite sufficient, but still it would keep out frost in the winter during the time he didn't have it with ice in. The building was very strong. It was about 30x50 feet. It was cooled with ice. A very substantial floor was put on it. It was a low cellar, then another chamber above that, and finally the ice up above arranged in a cage properly supported below, so that the ice was three feet from each wall, and there was over one hundred tons of ice placed up there during the winter. There was a strong circulation of air that went down over the sides of the ice. You could feel it and notice it with a candle or any flame. The cold air was constantly falling from above down those sides to the cold storage room below, and that was regulated with openings that you could let in a draft of cold air or you could turn it off. That was sufficient to keep the chambers below at the temperature he required, though the temperature was not kept below 40. There were several little practical details, such as the condensation of moisture in the lower room that he had to provide for by a series of zinc plates and so on; but the general principle was that of separating the ice on a frame about three feet from the wall with spaces that could be opened or closed for the cold air to descend to the chamber below, and there was provision made for the warm air coming up, and thus a circulation was kept up. It worked well for his purpose, but of course fruit was not thought of at that time. It was in Windsor.

Mr. HARTMAN: A year ago I read in a paper that somebody had applied for a patent on cold storage and used snow instead of ice. I noticed that in the Blue Mountains, in the clefts of the rock, you find a little snow and very little ice, and I wondered whether snow would be practicable.

Prof. CRAIG: I think we will have to adopt a system that will bring the temperature down to the freezing point, and the sooner we get to that the more perfect will

be the condition of the fruit. The basket package is not the form for cold storage. It should be in a box that holds fifty to seventy-five pears, in proportion to their size. In every case the fruit which is put up in packages of that character kept much better and was handled with greater satisfaction and packed better in the storage rooms. In Montreal, in this storage warehouse that I referred to, they have about forty rooms, each 20x30, and those rooms are double-walled, and the square packages, or packages of the parallelogram shape, pack much better in those than in any basket form, and the fruit is much less liable to be damaged.

Mr. WHITE : I think it would be advisable if our editor would get a proper account of such a building and publish it in the "Horticulturist." We cannot discuss questions of that kind here to any advantage.

Mr. BOULTER : Probably there is nothing of more importance to this society at the present time, and I would suggest that a committee be appointed to get all the information they possibly could in regard to it and have it published in the "Horticulturist." I believe some scheme could be devised that would be feasible in certain localities, and not come at such an unreasonable price as the figures we have had.

The CHAIRMAN (Mr. Wellington) : The secretary will take it in hand and do what he can and publish it in the journal, and probably Prof. Craig will kindly assist him in the matter.

Prof. BEACH : I am acquainted with a gentleman who lives on the Hudson River who has what he calls a cold room constructed very much on the plan of that just described by Mr. McNeill. He uses it for holding back the peaches for a few days—not more than ten days, sometimes not so long as that—and he sorts them out as he wants them and ships them immediately to New York ; but he lives so near New York that he can put them on the night-boat and have them there in the morning. I may be wrong in my impression, but I have an impression that the experience of the gentlemen who have had most to do with cold storage in that part of the country is that perishable fruits do not stand up well after they come out of the storage, and for that reason it would be best to have the storage in the market centres.

Prof. CRAIG : What kind of storage ?

Prof. BEACH : Any kind, after they have been kept back for a period of time in that cold temperature ; we know that frequently they do go down rapidly.

NOTES OF TRAVEL AMONG ONTARIO FRUIT GROWERS.

Prof. H. L. HUTT, of the Ontario Agricultural College, Guelph, said : In my account last year at Peterboro', perhaps I pictured rather highly some sights I saw among our American cousins. At any rate some of our members criticized me for booming American orchards and vineyards. Well, I will assure you that if I did so it was not to drive any of our Canadians across the line, but rather to stir us up to better things, to hold that up as an object lesson to us in certain respects that we might profit by it. Consequently, to-day I am on the programme for some notes of travel among Canadian fruit growers. No one is more assured of what we can do in this Ontario of ours than I am. I believe that with such varied climates and conditions we can produce some of the finest fruit and of the best quality and in great quantity. I have had the privilege this summer of travelling considerably over the province. Starting in the Niagara district near the Falls, we have what many of those who live there consider the garden of Ontario. In the vicinity of the Falls you will find acres and acres of large peach orchards and vineyards. It is a treat to anyone who is not used to that sort of thing to see the fine vineyards and orchards in that section. One which I have always enjoyed visiting is the fruit farm of Mr. E. Morden, who is a member of our Association. That is a place where you will see much in little. Mr. Morden is a thorough cultivator, and his fruit farm and nursery of thirty or forty acres is well tilled and filled with fruits of all kinds that can be grown there. Many others might be cited in that same district. It was my priv-

ilege also to visit some fine orchards and vineyards in the vicinity of St. Catharines. I went out one afternoon with Mr. Edward McCardle, who has four or five farms in that vicinity. On the Kottmeier farm he has one of the largest peach orchards I have visited. The crop of peaches was enormous, and his vineyards were loaded. Another farm of his known as the Martindale farm, is given entirely to peaches—15 or 20 acres—and at the time of my visit the trees were heavily loaded. Near there we made a visit to Mr. Barnes, who is one of the largest wine makers. At Grimsby we have the great fruit section. Grimsby has an enviable reputation as a fruit centre. It will be impossible for me to speak of all the fruit farms, but I cannot overlook that of our worthy secretary, Mr. Woolverton, who has a farm of 100 acres all in fruit, which is in itself a great experiment station. He has a greater variety of fruit than probably can be found in any one farm. It is one of the places Mr. James spoke of last night as having palatial houses and all the surroundings. Major Allan has a large plum orchard that at the time of our visit was heavily loaded with plums. Collingwood section has plums to a great extent, but in the Niagara district they grow plums that would astonish many of us. Around Winona we could not overlook the farm of Murray Pettit, one of our experimenters in grapes. His vineyards, about 30 acres in extent, include some thirty varieties of grapes, and he has quite a lot of pears and plum trees as well. Going a little farther west I might mention the nurseries of E. D. Smith, which are quite extensive, and he has a lot of very fine nursery stock there at the present time. On the farm of Mr. D. Tweedle, next neighbor to Mr. Orr, I found a stock of the finest plum trees I have seen growing even in any of the American nurseries. I should not have forgotten to mention the Fonthill nurseries of Messrs. Morris & Wellington which cover several hundred acres of land; so it is not necessary for Canadians to go out of their own country to get all the nursery stock of good quality that could be desired. At Stony Creek I was much interested in the visit to the fruit farm of Mr. Orr. He believes that what is worth doing is worth well, and we found things there kept in first-class condition. I think he has about 90 acres of land, and 30 of that is in fruit, about 50 acres in vineyard, and 800 or 900 plum trees, 1,000 or 1,200 pear trees. These orchards and vineyards are something that growers in that vicinity may feel proud of. Of course it is almost impossible to do justice to a section like that by mentioning only a few of them, but that is all we have time to speak of at present. Making now a long jump as far as Chatham, I was privileged to visit one of the large orchards owned by Mr. Dolson. He has a very large apple orchard of some 40 acres—some large old trees, fully as large as any we will find in the Grimsby section, not excepting those of Mr. E. J. Woolverton, of which we saw photographs yesterday. Coming into Essex county we have one of the great fruit growing sections. In South Essex we have a great peach section. Mr. Hilborn is right in the centre of that peach growing section. He has about 60 acres of peaches, probably as fine a peach orchard as you would find almost anywhere. He has about 6 acres of strawberries and about 100 different varieties growing. His next neighbor has also 50 acres of a peach orchard, newly set out; so you see in that vicinity they are going extensively into peaches. Their land is admirably adapted for it, and they know it. His neighbor on the other side, Mr. John Mitchell, has another good example of "a little farm well-tilled." Mr. Mitchell has about 25 or 30 acres in fruit, and has probably one of the best-kept fruit farms that we will find anywhere in the province. I spoke last year of the shortening-in method of pruning adopted in some orchards about Geneva by Maxwell Bros. Mr. Mitchell adopts that method of shortening-in the wood every year, so that his trees are compact, symmetrical, close-headed as any we will find in the province. Next neighbor to him we have the large peach orchard of Mr. Tyehurst—over 70 acres of peaches, most of them in bearing, among them a great many of what are spoken of as Tyehurst Seedling. Then in North Essex we have the great grape section. In Walkerville, where Mr. McNeill lives, we have large vineyards. Mr. McNeill has two large vineyards, in all about 50 acres of grape. His next neighbor to him, Mr. Montreuil, has about 30 acres. Then we take as circle, going around up in Huron, where it was my privilege a couple of years ago to visit some orchards. I don't remember anything quite so extensive, but nearly every farmer there has a small orchard of some extent, apples being the principal fruit.

Then coming north into the Beaver Valley, it is needless for me to say anything more than what has been already said. That valley is certainly a great plum-growing section, and we expect to hear more from them along that line. I visited the fruit farm of our friend, Mr. Caston, at Craighurst. As we all know, he is an enthusiast in fruit-growing, and if peaches do not succeed in Simcoe it will not be his fault; if they could grow there he would have them. But Mr. Caston is an enthusiastic experimenter, and has given a great deal of attention to growing all the varieties of fruit that can be grown in that section. He has already tested a great number of varieties of Russian apples. Taking a hurried run across the province down to Trenton, it was my privilege, along with Mr. Woolverton, to visit the Bay of Quinte district, and particularly the orchards of Mr. Dempsey, who has about 40 acres of apples closely planted and in bearing. It was a sight to see those orchards along in September. I never saw anything growing like his Snow apples and Ontarios—loaded to the ground. It was a revelation to me as to what they could do in apple growing in that section. Of course that is the great apple section, but I had no idea that they could produce fruit so abundant and of so good a quality as they have in that part. Mr. Dempsey has most of his pears across the Bay of Quinte in Prince Edward county, and I was pleased to notice that much-spoken-of Dempsey pear. I saw the original tree from which all the stock of that variety had been taken. Coming west we visited other orchards near Oshawa and Whitby. I will close by mentioning some things that we should observe if we are to hold our own and keep in the front rank as fruit growers. In the first place I think we must give more attention to the selection of suitable soil for the different varieties which we plant. I received a communication this spring from a grower in the Niagara district, saying that some disease had struck his grapes—that all the grapes in the centre portion of his vineyard were being affected by a disease that acted like black-knot, and it was spreading rapidly, and he was afraid it was going to clear out his whole vineyard. It was my privilege to visit that part not long after, and I found in that vineyard the trouble that is sometimes spoken of as black-knot on grapes. This all occurred at one end of the vineyard, which was in a low piece of ground. That is known not to be a fungous disease at all, but simply an abnormal growth owing to unsuitable conditions. This soil was too low and brought about this abnormal growth on the vines. In putting out trees or vines or plants of any kind we should always look to get them on the best and most suitable soil. Plums and pears we generally give the heaviest soil; grapes we always give well-drained soil. If there is one fruit above another that we can put on a moist soil it would probably be the currant or gooseberry. Peaches of course require the driest and lightest, but peaches on not too heavy soil will do fairly well, and are not so liable to attacks of insects as those on the light soil. Another point I think we do not observe as thoroughly as we might is the arrangement of our trees in orchards. I think we should give more attention to planting trees on the hexagonal plan. Nearly all the orchards we find are planted on the square—a very convenient method—but the hexagonal plan has the great advantage that we can get so many more trees to the acre without crowding than we can on the square. The honey bee makes use of that plan, in building his comb, which is built in hexagonal shape; in that way he can get in so many more cells to the square foot than in any other shape. If we adopt the same plan in our orchards we can get in many more trees to the acre. Taking apple trees 30 feet apart, we could get six more trees to the acre on the hexagonal plan than on the square; taking plum trees 10 feet apart we can get 25 more trees to the acre. This counts up quite a bit when we come to plant an orchard of any size. Then the question of cultivation is one that is often discussed, and I think there is not enough attention paid to it. The majority of our fruit growers do not give proper cultivation. There are too many of our orchards in sod. We cannot keep orchards continually in sod and expect them to do well. Sod should never be allowed in a young orchard. Trees should be cultivated till they come into bearing. Sod should only be allowed in a young orchard where the tree is growing so luxuriantly that there is a tendency to wood rather than fruit. This wood growth can be checked by sodding them down for a couple of years, but as soon as they receive their growth they should be cultivated. I am not in favor of plowing an orchard. If I had

my way I would do as I have done for a number of years at home—that is cultivate orchards without plowing at all. In plowing deeply in the orchard, or plowing at all, we disturb the roots more or less, and by keeping up a good system of cultivation by the use of the spring-tooth cultivator and broad share cultivator it is possible to keep the weeds down and never have to have a plow in them from one year's end to the other. Of course where land is so flat that it needs drainage, there is some excuse for plowing. I know Prof. Bailey advocates plowing, in order to stand drouth in the dry season. I believe we should give deep cultivation when we set out the orchards, but I think it is not natural to try and drive the roots down afterwards into the hard sub-soil by deep plowing on top. Then the fourth point is we must adopt more effective measures of fighting insects and fungous diseases. We must become more familiar with our minute foes. There are two little books I would like to recommend to all fruit growers. One is "Fungi and Fungicides," by C. M. Weed. It is one of the latest up-to-date publications on the fungi; I think the price of that is \$1.25; and another by the same author, "Insects and Insecticides." In these two little books we would get enough for the general run of fruit growers to be thoroughly posted in those minute foes that trouble our fruit plantations. We have that admirable work by Prof. Saunders, "Insects Injurious to Fruits." For descriptions of insects there is probably nothing that will equal that, but that has not been revised since the greater information in regard to spraying has been introduced. Then I think we must give a little more attention to the adoption of preventive measures for fungi. If each county or township which grows peaches or plums would enact and enforce the Black-knot and Peach Yellows By-law we would help to rid our land of these two troublesome diseases. I visited this year quite a number of peach orchards in the Niagara section which were being taken off rapidly with the peach yellows. Now, unless we follow that up and destroy the trees wherever this disease appears, unless we cut off our black-knot wherever we find it, we are not going to be rid of those diseases. I think each township should see that the by-law is enforced by means of inspectors. Then, there is just one other point, and that is, we want more fruit growers to practice thinning of fruit. There are too many of us who allow all the thinning to be done by the insects and by those fungous diseases—and they are not safe hands to leave the job to. Where we carry on spraying as it should be done on trees, we will find they will be fairly well loaded; and where trees are heavily loaded it is always advisable to thin out the fruit when it is small. Any of you who grow fruit for exhibition will understand what this means. That is how we get the fine specimens for fairs. Over-bearing not only injures the quality of the fruit, but it injures the vitality of the tree. It will only bear in alternate years, or probably bear for a few years and then stop altogether. If by thinning out there we thin out a number of seeds, we throw all the energies of the tree into the fewer apples left, and the production of pulp is much less drain on the tree than the production of seeds. So we can increase the apples to almost double the size, and increase the value of the fruit. (Applause.)

QUESTION BUDGET.

The Chairman read the following questions and answers that had been submitted:

1. What are the ingredients and proportions of the Bordeaux mixture? A. 4 lb. lime, 4 lb. copper sulphate, 1 bbl. water.

Prof. FLETCHER: Wouldn't it be well to mention that there is another formula: "6 lb. copper sulphate, 4 lb. lime and 22 or 45 gals. of water." This is a stronger mixture.

Prof. BEACH: For potatoes the stronger formula is better, but for fruit trees the formula you have given is all right.

2. May the Bordeaux mixture be used on grapes, currants, gooseberries and roses? A. Yes.

3. How often should apple trees be sprayed with Bordeaux mixture, and when? A. First application copper sulphate. One application before blossoming, and three afterwards at intervals of ten days to two weeks.

4. Will Bordeaux mixture destroy the insect that rolls the leaf on the Guelder rose or Snow Ball? A. Add Paris green.

Mr. BEADLE: What insect is that that is alluded to? There is more than one insect that goes after the Guelder rose.

Mr. WELLINGTON: Is it simply the green aphid?

DELEGATE: No, it is a black aphid.

Prof. FLETCHER: The insect which does the most harm to the Guelder rose in one generation appears green and the other with dark marks on the body, and it can be treated satisfactorily by spraying the bushes before the leaves open, when the twigs are covered with the eggs, with the kerosene emulsion.

Prof. BEACH: What strength would you use the kerosene emulsion at that time?

Prof. FLETCHER: The ordinary Riley-Hubbard mixture diluted with nine times the quantity of water.

Mr. WELLINGTON: The next question is, will it kill the bark louse? That question, I presume, is answered by your reply to the former question.

Prof. FLETCHER: Yes, sir; I think the best remedy undoubtedly is kerosene emulsion applied just before the buds open, or later.

Mr. WELLINGTON: The next question is, is there anything to destroy the scale on house plants?

Prof. FLETCHER: House plants are generally grown in sufficiently small quantities to make it practicable to wash them with soap, and that I think under all circumstances is the best treatment. If a sufficient number of plants are grown to use a mixture, a mixture of kerosene emulsion might be used quite satisfactorily. The scale on house plants I presume is the one that is common on the oleander and orange, and plants of that nature. The Riley-Hubbard formula is twice the quantity of coal-oil to soap-suds, and the soap-suds are made by dissolving half a pound of soap in one gallon of water. That is mixed with twice this quantity of coal oil, and you have then a standard emulsion, and with this you take either nine or twelve parts of water for application. For house plants twelve parts would be sufficient, because in a small plant you can apply it very thoroughly and see that every scale is touched. For application with larger quantities or large trees it is generally used in water nine times the quantity. For the Mealy bug a remedy is a small quantity of pure alcohol put on by a paint brush. The kerosene emulsion is good too.

Mr. WELLINGTON: Another question is, is it advisable to have holes bored in the apple barrels or to have the apples separately wrapped in paper?

Mr. A. H. PETTIT: The experiments which we have gone through in that respect when we shipped to Chicago were made in kegs lined with paper and the specimens wrapped in tissue paper. The gentlemen who kept the cold storage said they would not keep in that condition—the papers must come off and they must be put in the kegs. Our experience proved that this advice was not good.

The SECRETARY: The New York people didn't allow theirs to be unpacked and they came out in better condition than ours.

8. Which is best for apple trees, stable manure or wood ashes, and when should it be applied? A. Stable manure and wood ashes alternated in the spring.

9. At what temperature should apples be kept? A. About 33° Fahr.

SCORE CARDS.

Mr. A. H. PETTIT read the following report of the Committee on this subject and moved its adoption.

Prof. CRAIG seconded the motion.

Mr. MORTON : In adopting this report, do we commit ourselves to the values that are placed there? I approve of the system but I disapprove of some of the values on some things. Acting as a judge at fairs as I do very often, I would respectfully decline to follow some of the values, though I approve of the principle, and have for some years followed the system of judging by points.

The SECRETARY : If any gentleman wishes to amend the values, the Association will consider them at any time.

The CHAIRMAN : I don't think the values are fixed for good and all. They can be changed at any time, but it is questionable whether it is advisable now to deal with that. I do not think that adopting this report really commits any man to follow out these values. The Association as a whole, or this meeting, would be committed to the values that have been decided on for one year simply.

Mr. MORTON : We have here, for instance, a score card for "Collection of Apples." This card only proposes to add a maximum of ten for the quality and ten for covering the season. I think a good deal of importance should be attached to the fact that a variety of apples cover the season, and ten is altogether too small a number to be allowed out of a maximum of 490 points. It is proposed to give a maximum of ten points when we are judging apples and pears for cooking, the maximum of which is only ten for each individual species. For instance, ten varieties are shown which would aggregate a maximum of 120. In the one case it is only proposed to add ten for covering the season. In the other case, where it would aggregate 480, ten is also to be given. I think that less should be added for a collection of six varieties than if there were twelve or twenty-five. I think there should be a certain number added according to the number of varieties. If you were judging six varieties add twelve points; for twelve varieties add twenty-four.

The SECRETARY : If that was in the form of an amendment I am not sure but we would be willing to adopt it.

Mr. MORTON : I would prefer that the report be referred back to the Committee, because probably that is a point that they didn't give consideration to. I suppose the same thing would probably apply to pears. I am speaking solely with regard to judging on apples; I am not a judge on grapes and do not pretend to be.

The CHAIRMAN : Will the Committee act on this suggestion and defer bringing in the report till some time this evening and consider this matter? then we will receive the report and if necessary discuss it.

Mr. PETTIT : The Committee will accept that.

REPORT ON FRUIT EXHIBIT.

Prof. CRAIG read the report of the committee on Fruit Exhibit at this convention, remarking that the local organization deserved great credit for the efforts they had made to give such a fine display of fruit. On his motion, seconded by the Secretary, the report was adopted as follows :

Your committee have to report that at the fruit exhibit at the winter meeting of the Ontario Fruit Growers' Association held at Orillia, on Dec. 5, 1894, the display of apples was one of the finest ever shown at a winter meeting of the society. The collection of local fruit shown by the Orillia Horticultural Society was exceedingly creditable and

demonstrated that apples grown in the vicinity of Orillia reach a high state of excellence, and in point of coloring, size and flavor are unsurpassed by any in the province.

This collection comprised eleven varieties of fall apples and twenty-one kinds of winter apples, most of which were first and second prize plates preserved from the township exhibition.

Among varieties which stand out prominently on account of fine appearance and perfect development the following may be mentioned :

Fallwater, Pewaukee, Wealthy, Hurlbut, Fameuse, Mann, Ontario and Wagener. Fameuse and Wealthy as grown in this locality attain large size and take on a high color.

Among the newer varieties may be mentioned an attractive plate of Longfield, which has already been mentioned in the report on new fruits. This tree is reported as prolific and hardy.

Mr. Robert Willis, Orillia, exhibits nine varieties comprising winter sorts including fine plates of Wealthy, Pewaukee and Mann, which received first awards at the township exhibition.

Mr. J. H. Tool, of Orillia, also shows nine varieties prominent among which are Wagener, Wealthy and Pewaukee. Mr. Tool secured sweepstakes prize on collection of six varieties at the county exhibition.

A collection of fall and winter varieties shown by J. W. Wainman, of Orillia, is worthy of mention and instructive from a local standpoint.

SEEDLING APPLES.

A number of seedlings of Duchess were shown, exhibiting great variation, but not promising in appearance or quality. No other seedlings in this collection were considered worthy of special mention.

A seedling white grape shown by Rev. Geo. Williams closely resembles Jessica in appearance and quality.

In collection of apples by W. H. Dempsey, Trenton, Ont., are included a number of interesting varieties of European parentage.

Ontario is shown of good size and fine appearance. A fact which has been already noted in regard to fall and winter types of Blenheim Pippins is brought out by both varieties being exhibited. The fall type is much larger, with more color and fully six weeks earlier than the other.

A collection of sixteen varieties of Russian and hardy apples is shown by the Central Experimental Farm. Prominent among them are Arabka, Canada Baldwin, Scott's Winter and Gideon.

Thos. Beall, of Lindsay, shows fine specimens of Ontario, and a number of varieties without name.

Collection exhibited by W. S. Turner from Stormont county is worthy of mention. Fine plates of Gideon and McIntosh Red are shown.

Wm. Cornish, Little Britain, shows ten varieties of apples, mostly winter, all in good condition.

Mr. Wellington Fisher, of Orillia township, exhibited a collection of the newer varieties of apples well adapted to cultivation in this locality. A number of these were prize winners at the county exhibition.

J. C. Wilson shows four winter varieties.

W. H. Leif, Orillia, shows three varieties of apples all beautifully clean as an object lesson of the benefits of spraying.

Wilson Arnot, Trenton, Ontario, sends a collection of eleven varieties of apples, each made up of remarkably fine specimens.

An unusually fine sample of Ben Davis were shown.

Kings and Northern Spys are also exceedingly fine in regard to flavor and coloring.

D. Galloway, More Falls, Ontario, sends two seedling apples which are not of sufficient merit to be recommended.

Mr. DeHart shows six varieties of apples including seedlings and named kinds.

W. M. Robson, Lindsay, Ont., exhibits five varieties of apples among which was Magog Red Streak, which may be described as follows: medium large, roundish conical, deep golden yellow with slight blush, stem rather long and strong, flesh white, firm, fine grained, sub-acid, quality medium to good, most valuable for the north.

PEARS.

The collection of pears was small.

A. M. Smith shows Lawrence of characteristic fine quality, Keiffer and Anjou.

T. H. Race, Mitchell, Ontario, shows a large pear said to be of seedling origin; at this date quite unripe.

Linus Woolverton exhibits a Russian pear called Medviedka, small size, pyriform, quality medium, with some astringency. The tree being hardy this variety may have value at the north and should not be lost sight of.

W. M. Robson shows a plate of Josephine de Malines in good condition.

GRAPES.

W. M. Orr, Stony Creek, Ont., shows characteristically fine samples of Vergennes in a perfect state of preservation, which further emphasizes the value of this variety as winter grapes.

Murray Pettit, Winona, Ont., exhibits twenty-four varieties, including black, red and white. Among the newer varieties your committee noted Anderson. A black grape; bunch medium, not shouldered; berry, large round; skin thick; pulp melting; seeds large; quality good.

Early Dawn is a small black bunch and berry, not promising.

Among red ones excellent in quality are Essex, Agawam, Salem and Goethe; of white, Lady Washington, Niagara and Duchess; black, Herbert, Barry, Wilder and Aminia are noticeable. This exhibit should be highly commended on account of its educational value.

Catawbas in a well-ripened condition were also shown.

Linus Woolverton, Grimsby, Ont., shows twenty varieties.

Victoria, a white variety, bunch and berry medium size, commends itself as an amateur variety on account of quality.

Triumph, white, as shown is of poor quality, late, and cannot be commended.

Noah, white, appears to be worthless on account of poor quality, and liability to be affected by mildew.

The committee wish to express their appreciation of the efforts of the local committee in making arrangements for and getting together such a beautiful display of locally grown fruit.

Committee	}	W. H. DEMPSEY, (Chairman.)
		J. H. TOOL.
		W. E. WELLINGTON.
		JOHN CRAIG.

The meeting adjourned at five o'clock.

SECOND DAY—EVENING SESSION.

The PRESIDENT asked the Secretary to read his paper on the Inspection of Fruit, in answer to question 14. Shall we Drop Fruit Inspection or Push it Forward?

The SECRETARY read his paper as follows:

FRUIT INSPECTION.

The codling moth must be routed from Ontario orchards and our shippers must exert themselves more faithfully in spraying with Paris green which is the best-known

means of exterminating it. In packing, all wormy apples should be sold at home or fed to stock and never shipped to distant markets, or else the results will prove most disastrous to our Canadian export trade. Recently a carload of apples has been seized in British Columbia by the fruit inspector of that province and ordered to be destroyed because they were found to be infested with this moth. This is in accordance with one of the laws of British Columbia. The section reads—"All persons possessing, forwarding or distributing trees, plants nursery, stock or fruit infested with any insects, such as woolly aphis, apple tree aphis, scaly bark louse, oyster shell louse, San Jose scale, red scaler, borers, currant worms or other known injurious insects, shall have the same disinfected and cleansed of such insects before forwarding, distributing selling or disposing, of said plants or fruits.

Here is the clipping from the *Daily Globe* of Friday, November 2nd in reference to the seizure of these apples.

Mr. Bosworth, assistant freight traffic manager of the C.P.R. received the following despatch yesterday; "British Columbia Government fruit inspector is condemning apples shipped from Ontario on account of their being infested by a larvae of the codling moth, and he is insisting that a carload of apples now there shall be destroyed by fire. Unless shippers are careful in filling orders for British Columbia market to see that the fruit is free from infection of this kind, serious loss will result. Inquiry by the *Globe* among the fruit dealers of this city failed to reveal any cause of such alarm as is suggested by the despatch. There is no prevalence of the codling moth this year and the shipment in question they think must have been of fruit poorly handled, if it was not made up of windfalls."

There is no doubt much carelessness in the management of our orchards by some growers and consequently their fruit is badly infested with the codling moth. I know of an instance where one-third of a man's whole crop of apples was infected with the larvae of the codling moth above referred to. But this state of affairs can be largely remedied. Sheep or pigs in the orchard will eat all the wormy fruit as it falls, hay bands will catch them, spraying will poison them and careful sorting will prevent any of them being exported.

Would it not be well for growers of first class-fruit to be all agreed together that they will pack only stock which is free from worms, and graded according to our No 1 and No. 2 classes which have already been described in the, *Canadian Horticulturist*, and incorporated in the Dominion Inspection Act, and hand in their names to the editor for publication under a special heading in the advertising columns. Such a list would not need to cost each grower more than ten cents per month, and circulating, as it does among the leading fruit merchants of Canada, United States and Great Britain, would tend to bring our best growers into connection with our best buyers.

The desire for an inspector of apples is widespread, not only among fruit growers themselves, but also among apple merchants. In proof of this I give you here an extract from the "*Fruit Trade Journal*" published in New York.

"Many Canadian merchants are complaining of the swindling operation of some packers who top off barrels of apples with one or two good layers, and the balance with culls. There is talk of having the Legislature take up the matter and appoint an inspector. Leading fruit men of Ottawa have been interviewed by the "*Free Press*" as follows:

Mr. H. A. BROUSE said: "Yes I certainly am in favor of a scheme of Government inspection. The loss is something terrible, but we have adopted a remedy for our financial loss, though the annoyance and trouble cannot be repaid. We buy our goods in a way that we deduct so much for loss or deteriorated quality, but even then the evil is not avoided. We are annoyed by mixed barrels and fraudulent branding. It is impossible when getting in hundreds of barrels to examine them all and we often run against a badly packed barrel."

BATE & Co. said: "Yes we are certainly in favor of an inspector. It is a long standing complaint and a serious loss and cannot be remedied too soon."

KAVANAGH BROS. said: "This bad packing of fruit is a perfect nuisance and a matter of a great loss. Certainly a fruit inspector should be appointed at once."

The Montreal *Trade Bulletin* of the 23rd contains the following article on Apple Inspection:

"The present season has demonstrated the necessity of an inspection for apples, large quantities of inferior fruit having been shipped to the English market that never should have good forward. An inspection law, providing for the inspection of apples, would be the means of doing away with a great deal of miscellaneous consignment business now going on, as many buyers on the other side would prefer to buy either on a f.o.b. price here or a c.i.f. basis on the other side, if they were sure of the quality we were getting. An inspector's certificate would greatly facilitate the export trade in apples, while it would be the means of preventing the large quantities of poor fruit which find their way over to the other side, to the great detriment of the prestige of Canadian produce. The writer has mentioned the subject to several leading men in the export trade, and they are of opinion that steps should be taken, in order, if possible, to secure a proper system of apple inspection, especially as the trade is increasing so rapidly."

The question now before us is—Is apple inspection practicable or impracticable, and if practicable, how? Perhaps our previous plan was impracticable. No man is willing to undertake the work of apple inspection on the mere chance of getting now and then a car load of apples to inspect at ten cents a barrel, nor is any man willing to become responsible for the marking of a grade of apples in carload lots and thus assuming the responsibility of saying that the whole are No. 1 grade, but he can condemn such lots as he finds to be packed in a fraudulent manner.

I propose the employment of an expert fruit inspector by the Dominion who shall be paid a liberal salary and whose business it shall be, (1) in the spring to inspect fruit trees and vines that are being imported and thus prevent the introduction of fungous diseases and injurious insects; (2) in the month of June or July and August it be his duty to enforce the plum knot act and the destruction of peach yellows, and (3) from September to March to inspect such shipments of apples as it may be possible for him in order to prevent as far as he can, the shipment of any fruit that is fraudulently packed, or which is infected with codling moth or apple scab. Also any apples found to be inferior to the brand under which they are shipped, he shall cause the brand to be erased from those barrels. To the same man appeal could be made by either buyers or sellers in the case of a dispute as to whether a certain lot of apples which had been purchased was up to the grade marked upon them. He should also be empowered to give an inspector's certificate of grade to any lot of apples for export, on certain conditions, thus facilitating sales f.o.b.

Certainly the grades should be clearly defined, and then as much publicity as possible should be given to them, in order that they may become a convenient basis of bargains and sales between distant parties.

I move that after a full discussion on this subject, a committee be appointed by the president to take this matter into consideration and report at this meeting.

The SECRETARY moved that a committee be appointed by the President to take this matter into consideration, and to bring in some resolution giving the views of the association on the subject.

Mr. CASTON: As the subject matter of this paper is the same as one that was dealt with by a committee this afternoon, I move that it be referred to A. H. Pettit, Mr. Boulter, Mr. Fisher, Mr. Dempsey of Trenton, and the mover.

The SECRETARY seconded the motion which was carried.

SCORE CARDS.

Mr. A. H. PETTIT brought in revised report of committee, which was adopted as follows :

We, your committee, beg leave to report that having considered the advisability of awarding prizes at our exhibitions by a scale of points, as submitted by the Secretary, we would recommend the adoption of the score cards, with the amendment that in awarding the points for "Covering the Season" in collections, the maximum be computed on a basis of five points for each variety shown in such collection.

Committee	{	A. H. PETTIT.
		T. H. RACE.
		M. PETTIT.

COLLECTIONS OF APPLES.

Mr. A. H. PETTIT moved the following resolution regarding offering prizes for apples for export.

Mr. BEALL seconded the resolution which was carried.

"That in the opinion of this Association the offering of awards on large collections of varieties of apples at our exhibitions is not productive of profitable results, but in lieu thereof prizes should be offered for the best collection for export."

EXPERIMENTS IN SPRAYING.

Mr. A. H. PETTIT moved a resolution in reference to spraying experiments by Prof. Craig, which was seconded by Mr. Beall and carried heartily.

Resolved, That we the officers and members of the Fruit Growers' Association of Ontario, desire to express our warmest thanks to the Hon. A. R. Angers, Minister of Agriculture for the Dominion, for the prompt manner in which he acceded to the request of this association, in placing the able services of Prof. Craig at their disposal, to conduct the spraying operations for the destruction of fungi and insect pests, and we wish further to express our appreciation of the thorough and energetic manner in which Prof. Craig carried to a successful issue experiments which are of the utmost importance to the profitable cultivation of fruits in this province, and that the secretary be instructed to forward a copy of this resolution to the Hon. the Minister of Agriculture.

THE CODLING MOTH AND PLUM CURCULIO.

Prof. JAS. FLETCHER, Entomologist, Central Experimental Farm, Ottawa, said : "The plum curculio in its perfect state is a small beetle, and having studied out the life history of this insect we are able to get at the remedy. There is only one brood in the year. With some insects there are two or three broods. It is very important to find out the life history of an insect before we can begin to fight against it.

The plum curculio passes the winter as a perfect beetle. Knowing this we can understand how a remedy can be efficacious which at first sight would hardly appear to be so. The beetle in its perfect state comes out as soon as spring opens, and is in an active condition then to injure any of its food plants. Its food plants are of the plum and cherry families. It was found out twenty-five years ago by Prof. Riley, of Washington, that the perfect beetles feed not only on the new leaves when they first open out, but also upon the young twigs of the trees, the bark of the young twigs. Experience has shown us that an efficacious remedy—not perfectly efficacious, but sufficiently so to make it a paying and practical remedy—is the spraying of our trees with one of the arsenical pois-

ons, the most convenient of which is Paris green. Now, it was hard to understand how an insect which as far as most people knew only ate a small portion of the plum which was sufficient for it to lay its egg, could be poisoned by this remedy, but we find that it feeds on a larger quantity of the plant than that, for it feeds on the young leaves and also on the bark of the young twigs. With regard to the laying of the egg of the plum curculio, the statement has been made that this is affected by the poison which we spray on to our trees; but this is not the case, because the egg of the plum curculio is never at all exposed or in such a position that it can be affected by that poison. The *modus operandi* is this: the beetle settles on the fruit which it is going to puncture and injure. It often bites round a crescent-shaped channel in the side of the fruit, and lives in that way inside the crescent or flap-like portion of the fruit. It then lays an egg by burying the egg into that flap and inserting the egg and pushing it right down to the bottom of it by means of its beak, so that the egg is never exposed and cannot be affected by poison. The only good, then, in its application is that the insects in eating the leaves and the small portion of the fruit which they cut out in cutting out that channel, are subject to a certain portion of that application. Now, we do not know that this Paris green may not also have a deterrent effect in keeping the insects away from the trees altogether. We only know that good results are obtained by spraying the trees in the spring for the plum curculio. There is no necessity, nor would there be any good in repeating that spraying after the eggs are laid, but it sometimes becomes necessary to repeat the spraying from the fact that the egg-laying season lasts during considerable time. Many of the insects last in their perfect state for at any rate a month or a little longer, and in such an insect as the plum curculio, which begins the spring in the perfect state, the season is brought down to a much narrower limit than is the case with many others that emerge from their chrysalis or third stage at some other time of the year, because anything that may deter or check them in their development of course would extend the season during which the perfect insect emerges. It may not be necessary, but there may be no harm in mentioning for one moment that all insects pass through four stages. All insects come from insects like themselves. There is no such thing known in any branch of natural history as spontaneous generation; and although this is the general opinion among people not conversant with different branches of natural history—some people think that mosquitoes, cheese-mites and many other insects come into existence in some curious way that has not been explained, owing to the decay of the object upon which they feed—I merely say that this is entirely wrong. All members of the animal world, and insects belonging to the animal world, are subjected to the same laws and created under the same laws, whether they be large or small. All insects, then, come from the male and female like themselves and are reproduced. All insects pass through four stages. First of all there is the egg; then from that the caterpillar stage; then the third stage or chrysalis and then the insect. In the case of the plum curculio the egg is laid, a young maggot hatches from that egg and attacks the fleshy portion of the plum. After a time in the case of plums the fruit drops to the ground—in the case of peaches and cherries sometimes not at all—and very frequently cherries remain on the tree until the insect has passed through its second preparatory stage, and is ready to assume the third or chrysalis stage. At that time it leaves the fruit and falls to the ground. It remains under the ground for a short time, and then comes out in a perfect state in the autumn, and then hibernates or passes the winter under any object of refuge that it may find, either in the crevices of the bark, under grass or other litter left about in the orchards. That indicates to us the necessity or the advisability of clearing up all rubbish that may be left about in our orchards. Again in the spring when these insects appear, long before the flowers or the young fruit is ready to be injured, they frequent the trees and then go to the ground and hide about the bases of the trees, and only come out during the night or on dull days when they are not seen, frequenting the trees and eating the young bark. This shows us that the early spraying, combined with insecticides and fungicides that are so largely used, would be advantageous. I refer to the fact that insects may be deterred from attacking the trees by some other means than by the direct poison taken by being eaten. Now we know that various insects are attracted by various scents. People who collect insects frequently make a mixture of sugar

and beer or sugar and essential oils, which they place upon trees, and in that way insects are attracted to them. In the same way we find that every plant when bruised has its own essential odor ; if you bruise an onion, there is a peculiar odor ; if you bruise a cabbage, it is the same way ; and when we handle plants to transplant them, they become very much more liable to attacks of insects than when grown in the ground. Everybody has noticed that cabbages when grown in hotbeds are not so much subject to attack as when planted in the ground. This comes from the fact that in handling them they are subject to attack. Now, Paris green has decidedly a perceptible odor when mixed. Everybody has noticed the peculiar—and to some people very suffocating—odor that it has. Two of my acquaintances are so much affected by Paris green as to make it quite an unpleasant poison for them to use, and in fact one gentleman present here, Mr. Hilborn, cannot use it at all, and this is not fancy, because on one occasion when he was at Ottawa, I mixed Paris green with some other material and asked him to use it, and he came over to me some time after and said, "I don't know what that is, but there is Paris green in it, for it makes me feel faint or unwell." It may be that Paris green, having a peculiar odor, is a deterrent, and makes those insects keep away. It does not matter whether we can explain how it does keep insects away ; practical experience has shown us that when plum trees are sprayed in the spring the crop reaped from them is much freer from curculio than when it is not done ; therefore, fruit growers who want to save their pockets should spray their trees. This remedy is not so efficacious as it is in the case of the codling moth, which is the one that is spoken of so frequently as the apple worm. This apple worm is the result from eggs laid by a small moth. In the latitude of Ottawa, we have distinctly only one brood in the year. When you get west of Toronto you come to a region where there are frequently two broods. When you get to London you come to a district where there are always two broods, and the second one is the more injurious. When we get to the Pacific coast, and California and Oregon and Washington Territory, there are three distinct broods, and sometimes what is called a subsidiary brood, that is, an accidental brood which grows in certain seasons. The life history then changes in different districts. At Ottawa, we can spray our fruit trees once in the spring, and the practical result is that our trees are exempt from the codling moth ; and I think it is not too much to say that if trees are carefully sprayed in the spring, during the time that the moth is laying its eggs, our apples will be free from the codling moth. Prof. Craig, in treating our orchard at Ottawa, has had this result which I speak of. His apples were practically clean, and no appearance of the apple worm, and this was from the careful way in which the work was done. Mr. Robert White, who is present, tells me that they were practically eradicated from his garden after he sprayed. Before he did so they appeared every year, and he hardly ever got a crop of Tetofskys or Duchess apples, and now he has them ; and of course they come at a time of the year when apples are very valuable, because they take the early market and are very acceptable and easily sold. I would direct the attention of all fruit-growers and those interested in the growing of fruits to the little bulletin that has just appeared from our own Department of Ontario at Toronto Prof. James has given here some extracts from letters which he has received, and as it will be useful perhaps to comment on some of these, I will, with your permission, take a couple of minutes to read some of them. From Essex he gets the report : "Apple worm very bad on trees not sprayed." Then we may gather that upon those that were sprayed they were not so. This merely bears out and confirms the experience in other parts of Canada and North America. Again from Essex : "There have been a few local tests of spraying apple trees. Where they have been sprayed three or four times at intervals, the results have been almost marvellous." Then he goes on to say : "Fine, large and good apples." From Leamington : "People are finding that it pays them to spray" That is the crucial test that we have to apply to all our work ; if it does not pay us to spray, it is no use doing it ; if it does pay us to spray whether the results are what are claimed for the methods or not, we must do it if we want to make a success of our business. From Huron county : "Insect pests, notwithstanding the application of the Bordeaux mixture, have done immense harm to orchards this season." And why shouldn't they ? This is one of the instances that were very frequent years ago, but not so much to-day, when people

thought it was a panacea whatever the insect attacked. Now, Bordeaux mixture, although it has very decided insecticidal qualities, is not an insecticide first of all; it is a fungicide, which, by virtue of copper salts, destroys all fungous pests; and we are going to get to this difficulty now, that as it has become popular and people in Ontario and Canada are saying it pays them to spray, a great many people who don't pay the proper amount of attention to the proper methods for any certain disease or injury, are going to use the wrong application. Now, Bordeaux mixture is not an insecticide to be applied generally, and as a matter of fact I only know of two particular kinds of insects where Bordeaux mixture actually acts as an insecticide. One of the most remarkable of these is with regard to the potato. Now, the Colorado potato beetle is very easily treated, as everybody knows, with Paris green; but there is another little insect, the flea beetle of the potato, which is extremely difficult to treat with Paris green. Two very good results have come from the work of Prof. Jones of Vermont, and of my own at Ottawa, during the past year—that potatoes sprayed with Bordeaux mixture to prevent the fungous disease known as potato rot, were also exempted from the attacks of the potato flea beetle. The potato flea beetle, although not in Canada such an injurious insect as many others, is reckoned by Peter Henderson as of more injury to potatoes, as injuring the crop, even than the Colorado beetle, and he found it most difficult to abate. Now, we find that the Bordeaux mixture acts as an insecticide for that. The same results were found with Prof. Craig in Ottawa. This year, when they were spraying with the Bordeaux mixture and Paris green, excellent fruits were grown, and with very much less trouble than ever before. We must know these different remedies. We must know those that are applicable to the case in question, and those are the only ones that we must apply, and we must not expect that we are going to get those results easily. It has taken fifteen years of constant dinning, point after point, to get the people of Canada awakened, and I don't know anything that has given better results than the resolution passed by this association last year, by which the Government at Ottawa was requested to get Prof. Craig to lay out that plan of experiments; and I think there is nothing that the country should be more thankful for than that this association did pass that resolution, that the Government did send Prof. Craig, and that you had such a competent man to carry out that work among so many difficulties. When on one occasion he went there, and all his pumps burst and everything went wrong, he was not disheartened at all, but he got off by a night train and went into the United States and got the best pump that was to be had, and forced a success when other people would have failed. (Applause.) I think that everybody should recognize that it is not only the work done by the association in getting that plan suggested and brought about, but the exceptional man that you had to carry it out and force it through to success. Now, it is necessary for us to know which remedy to apply, and therefore I have always made it a practice in speaking and writing to condense the experience of others with my own down to the point of saying which is the best remedy, to mention that one remedy only, and let other people that like to experiment go through all the work again that other people have done, and play with the other remedies, and amuse themselves if they like; but I tell them beforehand that it is going to be an expensive amusement, and they had better consider beforehand and find out which is the best remedy. Now, which is the best remedy for those two insects I have spoken about? People say Paris green is not an efficacious remedy for the plum curculio, and they say jarring trees is a better remedy. Well, so it is if you are playing at fruit growing; but if you are making a business of fruit growing and you have seven or eight thousand trees, I think you will find it is rather an important thing to find out which is the only practical remedy. Now, the only practical remedy is spraying your trees with these arsenites that I have mentioned, and those of your best fruit growers that have their experience say that it is the remedy which finds them, and is therefore a practical remedy. It is my duty to consider most carefully all the remedies that have been suggested, and I unhesitatingly say that the remedy for plum curculio is spraying the trees in the spring. An early spraying will be more efficacious than if you begin only when the fruit is formed. With regard to the codling worm I forgot perhaps to mention that its life history is this: The egg is laid by the moth when the apple flower is turned up. You remember on the

plan that was shown this afternoon by Prof. Beach, the flower of the pear is cup-shaped. It is the same in the apple flower. You all know that as the apple increases in size, the weight is greater than the slender stem can bear, therefore it is carried down by its own weight, so that the cup, the calyx, is turned down. Then you must do your spraying before that calyx turns down. A sufficient quantity of this poison is lodged in the cup of the flower, and when the young caterpillar, which is extremely delicate, first hatches, it is at once killed and never makes an entrance at all into the apple. With regard to the second brood, which in this district or probably farther south than this, occurs injuriously—and this year was injurious on the pears in the Grimsby district—it is rather a more difficult subject to treat; but if you mix with your Paris green the Bordeaux mixture for your fungous diseases, and you spray your apples anywhere in the first half of the month of August, you will spray them when the eggs are being laid for the second brood of the codling moth. Generally, where two fruits hang together I think you will find it would pay you very well indeed, and the results will be satisfactory if you spray your fruit at that time. The dangers of spraying with Paris green have I think been so thoroughly explained away that we need not discuss them now. Careful analyses have been made over and over again, by which it is shown that the elements remove all traces of those poisons, and if the rain and wind do not do so, the natural expansion of the fruit forces off this dry powder so that it does not remain on the fruits.

I shall now pass on for a few minutes to some other insects, to put you on your guard against them. One of the insects which has occurred this year is known as the pear tree *Psylla* or pear tree flea louse. It belongs to the same class as the aphid, but it has the very decided difference of being able to jump, and is therefore called the flea louse. Its injury is this: it enters the stems of the flowers of the pears just as they open. The consequence is they drop from the trees, and flowers and leaves also, and even if the leaves only drop the fruit will be injured, because the fruit has not the leaves. There is an excrementitious matter dropped by these little insects upon which a dirty fungus grows. The remedy is the kerosene emulsion which we spoke of this afternoon, and we have found by spraying the trees with this in spring, just as the leaves are opening, that these insects are destroyed and all injury stops. Another insect which fruit growers must be put on their guard against is the Pernicious scale or the San Jose scale. This is a native of Chili, in South America. It was introduced into California on some scions of fruit trees brought from Chili some fourteen or fifteen years ago. It was introduced three years afterwards near San Jose, California. The fruit packers and merchants gave it the name of San Jose Scale from that fact. In 1881, at the time it was described by Prof. Comstock of Washington, it was called Pernicious because it was the most pernicious enemy of deciduous fruit trees on the Pacific Coast. It had confined its injuries to the Pacific States. This last year was found not to be the case—it was found in Maryland, New Jersey, and some other of the Eastern States. At once the United States entomologists got out a circular, of which twenty thousand were issued in one month, to all the fruit growers and entomological societies, and it was well advertised. The effort that was made by the Government Department was followed out by the nursery men and fruit growers to the extent that probably at the end of this year, or certainly during this season, that insect will be eradicated where it has been traced. Great care has been taken to find it out. It has been traced into every orchard, and it was traced back to two nurseries in New Jersey, and their order books have been gone through and everybody to whom fruit trees have been sold has had his orchard visited; and I think we may say with very great reason of hope that it will be thoroughly eradicated during this season. I mention this to you because undoubted specimens of this insect have been sent to me from British Columbia. We shall take vigorous measures to have it eradicated. The British Columbia Government has taken very decided action to keep it from their province. Fifteen carloads of apples which were sent from Ontario growers to British Columbia were condemned and destroyed by the British Columbia Government, causing a great deal of friction; but when my opinion was asked I had to say that I thought they were justified in taking those extreme measures, because the codling worm does not exist in the Province of British Columbia. I took it for granted that it must exist there, as it is extremely injurious in Washington Territory, and

California and Oregon. From all authoritative sources of information, however, I cannot find confirmation of the statement that the codling moth is bred in British Columbia. If that be the case the Government of British Columbia are justified in most strenuous efforts to keep it out, for we here know how much the loss is; and on that occasion I wrote to the Government saying I believed the Executive officers of this Association could put the buyers and the shippers in possession of lists of the advanced fruit growers of this Association who had adopted the methods which had been advised so long of spraying their fruit trees, and in that way producing uninjured apples. I have not had an opportunity of asking you, but I think it is probable that either the Canadian Pacific Railway or some of the authorities will apply to me for that list; but this I know, that if the fruit growers here have applied the accredited methods that have been advised, they certainly have grown clean fruit if that work has been done carefully and properly as we know it ought to be. The remedy for the San Jose Scale is that same kerosene emulsion which we have mentioned. During the winter it may be applied to all trees at the dilution that I have mentioned—nine parts of water to the stock standard emulsion.

Mr. HILBORN: Would you please describe that scale?

Prof. FLETCHER: The general appearance of it is as if the branches of the trees had been dusted with ashes or lime.

Mr. HILBORN: I found a tree like that in my own orchard this year.

Prof. FLETCHER: Then you must examine it critically to see whether the scales when removed from the branches are oval or elongated. If it is a San Jose scale the scale is round, and it is the only round scale that is likely to occur on our trees in Canada. When full grown it is from one-eighth to one-sixteenth of an inch. When taken off the branch—each scale taken off and separated—it is only then you see the extent, so that the appearance is of a small round scale one-tenth of an inch in diameter and of a small protuberance in the centre, but lying flat on the branch and giving the branch the appearance of being dusted with ashes or lime.

Mr. HILBORN: That is just about the description of what I have.

Prof. FLETCHER: I should be obliged if you would send me this. It is a very serious matter to decide what it is.

A DELEGATE: What varieties of trees does it attack?

Prof. FLETCHER: It attacks everything. It has done the greatest injury to peaches, oranges and stone fruits, but in California they found that every variety of deciduous fruit trees—all the trees that drop their leaves were attacked by it.

Mr. HILBORN: This was on young apple trees?

Prof. FLETCHER: It attacks apple trees very seriously.

Mr. MORTON: Does it attack any ornamental trees?

Prof. FLETCHER: Yes. Scale insects of all kinds are extremely abundant and injurious. The ordinary oyster-shell bark louse is a disgrace to the province and the whole of North America, because it can be controlled, and the methods are to fertilize well your orchards, feed them and see that they are properly cultivated and attended to, and if that does not keep them down spray your orchards with kerosene emulsion, and they can be overcome. The bud moth may be overcome by emulsion. A minute caterpillar spins a case shaped like a minute cigar. The life of the insects is this: the eggs are laid, and the very small eggs of the caterpillar are seen at the end of August. They go beneath the leaves and cluster round the twigs of the apple trees, particularly on the spurs where the bark is a little rough. They remain there during the winter. In the early spring they come out and puncture the stems and leaves and flowers of the apples and do a great deal of harm. The only remedy which has given a successful treatment is to spray them early in the spring with kerosene emulsion. This has the effect of puncturing into these little cases and getting into the caterpillar beneath. The buds are not sufficiently large to hold Paris green, so emulsion gives the best results, although Dr. Young, of Adolphustown, treated them successfully with Paris green. For borers in apples the treatment is a pre-

ventive one, and every fruit grower should adopt the method by which all his trees are washed with a preventive wash to keep out borers during June every year as a matter of course. I do not think I have ever seen a borer at the Experimental Farm, and the reason I believe is entirely that Mr. Craig systematically and as a method has all his trees washed with the ordinary soda and soft-soap wash every year. Mr. Wellington Boulter has a method of washing his trees with strong lye, and he has trees half as big as my body which are just as smooth as the young bark on a new limb, and from this careful treatment systematically done every year. The young insects which lay the eggs from which the borers come are beetles. They will not lay their eggs on trees which have been washed with the deterrent wash such as I have mentioned. The canker worms all through Canada have done up and down a great deal of harm where the trees have not been sprayed with Paris green. I know there are instruments called tree-protectors, that there are bands of straw, and many other things to protect trees, but I don't think they pay for the time necessary to put these bands around the trees to keep the moths from climbing up in the autumn. One plan is to put a band of paper with sticky stuff on to keep the moths from going up, and I was asked, is it satisfactory? Yes, it is for a certain time, but when we have some days that are extremely cold, whereas that sticky stuff has to be kept in a viscid state, it does not work. These insects come up from the ground and that viscid matter—be it printers' ink, or rosin and linseed oil—in the cold nights will be sufficiently hard for the insects early in the morning to walk over it, and when the insects are very numerous they get so thick on the bands that those walking up walk over the bodies of those that have been caught in the bands. I believe the best remedy for the canker worm is to spray your apple trees at the same time as you do for the Codling moth with the Bordeaux mixture and Paris green. The bark beetle is very troublesome in the Niagara district, and is now doing a great deal of harm. This beetle only bores in the bark, but it has the effect of bringing out from the tree on every warm, dull day in the winter large quantities of gum—so much so that you can take two quarts of gum around the base on a small six or eight year old peach tree. Now, that gum is taken from the tree, and the amount of mucilage that is taken out of that tree is so much strength taken out of it which would have gone into the fruit of the following year. The result is that those trees are injured. Up to the present I have not a satisfactory remedy for this insect. We have found, however, that it is active and begins to work as early as February. On the bright, sunny days these little creatures come out. This year we shall try earlier to control it, and I think that applications to the bark of either kerosene emulsion or mixtures of whitewash and Paris green frequently repeated will have the effect of keeping this insect in check. Currant worms of course turn up every year—it is one of the insects which has been mentioned to me as injurious. The remedy is to spray them the first time they appear, just when the flowers are opening, with Paris green, or dust the bushes with Paris green and land plaster or lime, or some other diluent of a dry nature in the strength of one pound of Paris green to fifty of powder. There is no danger in using hellebore, for although it is a poison it is a vegetable poison which once diluted loses its power, and only affects insects on the bushes at the time. There is no use making tea out of used up tea leaves; it is the same with hellebore—having once diluted the dry powder it loses its strength, so it is not likely to be dangerous in any way in placing it of your currant bushes. The oblique banded leaf roller was injurious at Freeman, and was sent to me by Mr. Freeman of Freeman at the same time as the pear tree siller. I would like to refer to a matter that came up through the association, and upon which Mr. Craig and I wrote a letter to the "Canadian Horticulturist," and which has been referred to by Mr. Woolverton this evening, and that is the presence of black knot. I think we have got about to the understanding of this, that it does not matter very much to fruit growers whether that injury or disease is due to an insect or fungus or animal or anything else, but we do know this, that if these black-knots are cut out and destroyed you don't have the same danger to your trees afterwards; so I think we may give up the discussion. I don't think probably anyone that wrote the articles that were written will be prepared to say it was due to an insect any more than we say that mushrooms are due to the maggots which we find in them when they begin to decay; but the argument has been that because the black-knot contains maggots when they are

decaying, that therefore the maggots form them. I don't think the man is found yet who would argue that maggots in mushrooms form the mushrooms. Let people have their theories and amuse themselves with them; but if you want to grow plums, cut out your black-knots—that is all the part that concerns you or me; cut them out, and you will have them a good deal freer. (Applause.) In the township of Nelson, in Halton county, owing to the energy of Messrs. Peart, Fisher and Freeman, they have induced their municipal council to pass a law by which they insist that inspectors should be appointed whose duty it is to go through the plum orchards and see where the black-knot occurs. It is the same, I believe, in Mr. Pettit's region. They go through the plum orchards, and if they detect plum knot they notify the owner of that orchard that black-knot is there and that he must get rid of it. If they have not done it in ten days they become liable to an action, to be brought before the magistrate, and more than that—here is the safeguard—if the inspector does not make those people cut it out or take them before the magistrate, any ratepayer may have him brought before the magistrate and fined for that neglect of duty. So I think the time will come when we shall get rid of the black-knot if this method is generally adopted and carried out. A great advance has been made in horticulture during the last three or four years. Three or four discoveries may be mentioned which have revolutionized the whole of agriculture in this country. First of all there was the discovery of the spraying nozzles; and don't forget that when we recommend spraying a tree we mean spraying—we don't mean sending a douche over a tree or sprinkling a tree; we mean sending a spray that falls in a light, dew-like mist over the plants. To do that you must have a proper nozzle and a proper pump, and if you carry your pump in the shape of a knapsack, you must have pluck enough to do it till it hurts you. It is pretty hard work, and if you get a man to do it for you, you must see that he does it till it hurts him, for it is a very hard thing to pull the handle of the pump hard enough to force your liquid into a spray; but if you don't do it you might almost as well not do it at all. You have to cover the whole surface with the application. The discovery of the kerosene emulsion—the mixture of these chemicals and some coal oil which would render it innocuous to the plant you put it on—the discovery of the arsenites—are all discoveries of enormous importance. They are advantages you have which your fathers had not; for insects' injuries are no more abundant now than they were then, only fruit growing was thought so little of that they didn't think anything if they lost three-quarters of their crop in those days. Now, it has become a business involving not only an enormous amount of capital, but scientific knowledge and data which are necessary to every man to apply these remedies intelligently. More than that the advanced fruit grower to-day recognizes this, that many of these insects are not an unmixed evil, because he knows that if he will only apply the accredited and best methods that have been discovered he will secure enormously better crops than his ignorant and negligent neighbor who does not apply anything at all. (Applause.)

Mr. MORTON: I desire to move that the thanks of the members of the Fruit Growers' Association and the audience present, be tendered to Prof. Fletcher for the lucid and concise as well as exceedingly interesting discourse he has given us this evening. One of the pleasant features to me is that he is able to get down to the common understanding of us common folks. Scientists very often are apt to indulge in that unintelligible jargon with which they attempt to convey their scientific ideas. I for one must say that I have been intensely pleased with the discourse that we have had this evening.

Mr. BOULTER heartily seconded the motion, which was carried amid applause, and Prof. Fletcher briefly acknowledged the vote.

The SECRETARY: I want to ask a question about the raspberry cane borer. This letter was sent to the Deputy Minister of Agriculture, and the inquiry is this: "As you are to be at the big meeting on the 4th where the greatest of scientists and experts will be, I and many others will be forever obliged if you will ask in the open meeting what is best way to prevent the spread of the cane borer and saw-fly in raspberry bushes? If it gets a little more headway in Ontario we will have to go out of the business. I can cure any disease among bees, but I am beat out with the disease in raspberry canes."

Prof. FLETCHER : I don't know how the gentleman has had such difficulty, because among injurious insects I don't know one that is less trouble to combat than the raspberry borer, if I am thinking of the right one. It attacks the raspberry shoot for the following year when it is about two and a half feet high, and the tip at once fades and turns down, so that you can tell every tip that is injured, and you can cut off the tip of the cane.

Mr. HILBORN : I think it is the one that lays the eggs.

Prof. FLETCHER : This is not the borer at all. These eggs simply are the eggs of the tree cricket, and the part affected may be easily cut off and burned. The saw-fly is quite easily controlled with either hellebore or Paris green.

Mr. CASTON : In using this kerosene emulsion for fruit trees do you use the ordinary soap or whale-oil soap ?

Prof. FLETCHER : The whale oil soap is better, but the ordinary soft soap will do as well. Whale oil soap is much more expensive, of course.

Mr. FISHER : May we expect to destroy the oyster-shell bark louse by using Paris green ? I have had an experience which leads me to think so. I have an orchard of considerable extent, and I am not just prepared to explain just why it was that the bark louse appeared there, whether I starved it or was very careless with it or how it came about, but I was very much alarmed at the condition of the trees, and eight or ten years ago, when we commenced the use of the Paris green, it seemed as if the orchard would be destroyed by the bark louse, but shortly after we began to use the Paris green the lice began to disappear, and it may be that I was so fortunate as to use it just at the time that these lice were in their infancy and crawling about the limbs, and that the burning effect of the Paris green cauterized them or destroyed them.

Prof. FLETCHER : I think it is probable that at the time you used Paris green you also began to pay a good deal more attention to your orchard, and you cultivated it and paid more attention to keep it in condition. I think I may say unhesitatingly that Paris green would have no effect whatever on the oyster-shell bark louse, even on the small insects.

Mr. BOULTER : I showed you when you were at my orchard how we got rid of it with lye. Take an old broom that your wife throws away, and a little lye, and you will soon get rid of the bark louse. (Laughter.)

Mr. FISHER : May we always depend on Paris green to operate against the canker worm ? At Burlington last summer we had a case on a large orchard—I think there are thirty-six trees in it—and the canker worm appeared there very numerous indeed, and the owner of the orchard took extraordinary pains to destroy them with Paris green, and although he had two pumps working there day after day continually, there were portions of that orchard that looked as if it had been under the influence of fire, and remained so till the second crop of leaves made their appearance.

Prof. FLETCHER : Certainly in treating the canker worm you can always rely on the Paris green doing its work, but the canker worm is one of those insects that hatches from the egg over a very extended period, and some will hatch at any rate over two weeks. Some batches of eggs laid some time before will hatch two or even three weeks after others, and the period is extended. I can only suggest, without knowing it, that after one of his sprayings these caterpillars hatched ; or there was rain and that these caterpillars hatched afterwards ; but certainly wherever it has been tried and the eggs had grown it has been efficacious. In Winnipeg last year it was one of their most serious enemies. I saw it in shade trees in the streets. It attacks the box elder or Manitoba maple. The remedy was effectual there. I can only suggest that in the case referred to it was raining up to the time the eggs were hatched.

PRUNING TREES—ESPECIALLY THE APPLES.

By W. S. TURNER, CORNWALL, ONT.

I have undertaken to introduce this topic more with the expectation of receiving than of imparting knowledge for, as I understand the art, pruning is practiced more with the idea of *guiding* and *directing*, rather than doing nature's handiwork in the growing of a beautiful and graceful tree.

Pruning should commence when the young plant comes from the nursery; one humorous writer has said it should commence at the first sprouting of the seed. Be that as it may, it is sufficient for our purpose that we start with the young tree from the nursery, and before a knife is used.

The form, habit, and nature of the tree must be first considered, as it is not desirable to check the natural inclinations of the tree too much. For instance, the Northern Spy, having an upright growth, should have a different training from the Fameuse, which is of a low, spreading habit. I would say then, commence with this requirement of the tree in view.

When the young tree is planted, see that all broken or damaged roots are neatly cut off, preserving as much as possible the fine roots. Cut the tops to three or four branches, if it is of a low growing habit, prune so as to have the topmost bud pointing upwards and outwards, if of a tall variety, have the topmost bud on the inner side of the tree, and then watch developments. Try and avoid forming a crotch; and the most important time to prevent this, is the first two or three years of the young tree's life.

If this is done, the pruning in following seasons will be simple and easy, as no large branches will have been permitted to grow out of their place.

Pruning large branches. A grower will hesitate before he cuts off very large branches, but when this is necessary, use a fine saw, cut part way through on the under side first; this will prevent the bark from tearing below the cut, trim off the cut and rough edges with a sharp knife, and give a coat of shellac, thick paint, or anything that will make it impervious to the weather. Care should be taken that the centre of the tree be not allowed to grow too close and thick, nor yet too much of a cup shape, as the latter plan would bring the weight of the fruit on the outside branches, on the other hand, the sun would be kept out, so the happy medium is necessary, and the grower will have to be governed to a great extent by the habit of the tree.

It is scarcely necessary here (only as a reminder) to speak of suckers and dead limbs; no thorough workman will have such a thing in his orchard.

At the Farmer's Institute meeting held in Cornwall, November 27th, 1894, the following question was put to Prof. Craig, the horticulturist, who was speaking on fruit growing: "Is a dead limb a greater drain on a tree than a live one?" The answer was, that, practically, it was a greater drawback to the tree, it was a lodging place for all kinds of destructive insects, the rot would also penetrate the tree, and eventually destroy it.

I will leave the pruning of small fruits and ornamental shrubs to those who are better qualified to deal with them than I am.

In pruning shade trees and fruit trees also, I would protest against the habit of leaving short stubs on the trees; cut close, and neat, having an eye to the symmetry and form of the tree, paint the cuts with some color that will be in harmony with the bark of the tree. I saw a large mountain-ash severely pruned the other day, and cuts painted a bright sky blue; this did not say much for the æsthetic taste of the proprietor.

I have endeavored in this short article to arouse in interest on this subject, and if I have succeeded, I shall be well repaid.

BULBS.

Rev. W. BACON, of Orillia, read his paper on "Bulbs," as follows :

Allow me before I address myself more immediately to the subject assigned to me, to express my great appreciation of the honor done to our town by the visit of the esteemed members of the Ontario Fruit Growers' Association and its directors, who are doing so much to develop the best and most refining of our industries—industries in which artisan and millionaire alike may engage with pleasure and profit. Moreover, I would like to say that I regard it as a great honor to be associated in any way with them in this their annual gathering, though I fear my subject may not much interest them, or create in those who hear me, the enthusiasm I feel in it personally. I note with great pleasure the increased interest which you as a body are showing in the department of floriculture, and in this division of a horticulturist's pursuits and pleasures, the long-neglected race of bulbs is again engaging the attention of the greatest specialists and being introduced more fully to all classes than for many years; and I know of nothing in the world Flora more deserving of the admiration and attention of all classes than the multifarious species of this division of flowers.

In the time at my disposal I can only hope to deal with a limited number of many interesting varieties, which should engage one's thought and attention, and receive at our hands a fair trial, and give a few descriptive notes on each in passing.

Before I begin to enumerate these and attempt a description of them as far as I know them, it may be well to give a few hints, as to soil, nature and natural habitat.

To begin with: The conditions offered in any well-managed garden are well suited to bulbs in general; but the soil best adapted for the cultivation of bulbs is one of a light, sandy nature of good depth, and well enriched with thoroughly decomposed manure, resting on a well-drained subsoil. This latter point is not essential to all alike.

Amongst this class of plants are found many of our earliest popular spring flowers, such as snowdrop, crocus, squills, tulip, narcissus, etc., all of which have either fleshy underground stems called corms, or attenuated stems coated with thick fleshy scales. These possess one important character which is nearly universal amongst bulbs, namely, that during the winter and early spring months they are in active growth, and during the summer and fall they are in a dormant condition.

The practice of lifting the bulbs annually as soon as the leaves have died down, cannot in the case of many of them be denominated a natural one, and when it has to be resorted to as a matter of necessity there are some points of precaution to be observed. First, before the bulbs are lifted be sure that the leaves have died away naturally, the strength of the bulb depending almost entirely on the complete development of the foliage. In the second place, when lifted, the bulbs should be well dried in their outer coverings before they are stored away in a perfectly dry, cool place; as dampness and heat are liable to exert their dormant energies and induce root development. Thirdly, they must be planted again before any root action has taken place, else serious detriment will ensue to both leaves and blossom.

Nature will teach us some of the best rules to follow and instruct in her economies. Under natural conditions we generally find that bulbous plants are associated with other plants; not infrequently do we find them growing in masses under the shades of trees, or along the margins of plantations and in the forest. Here you see in operation the much talked of doctrine of reciprocity. The periods of active and dormant life are admirably sustained by this provision of nature. In winter and spring when other forms of vegetable life are in a quiescent state the bulbs are making their best and most important growth; the leafless branches of the trees enable the rains and the melting snows to penetrate the ground and fertilize the bulb to the very stems; but see! as soon as these messengers of life from the apparent dead have presented in their turn spring greetings in gorgeous colors and delightful perfumes they bow their many-colored heads in a graceful adieu, and the new growth of surrounding herbage and the leafy canopy above provide that shade and dryness of soil which affords perfect rest. This is the most important stage in bulb culture. Here then you see nature's laws. These observations are applicable to almost all bulbous plants.

Let us take up a few of those that are equally good for house and garden growing, some of which are not generally known, or as much as they deserve to be.

Take up first the *Allium*. These are of very early culture and, being quite hardy, are as good for the garden as for the house and conservatory. They can be had in three distinct colors, pretty blue, soft yellow, and immaculate white. They continue to bloom in rich profusion from December to April. The flowers are borne on long, clean stems and much admired. Don't crush the stem or bloom or you will soon discover the family to which they belong. Very cheap. Plant six or ten in a pot.

Achimines must be mentioned as one of the beautiful gesnerads with a pretty trumpet-shaped flower and bronzed leaf. A continuous blooming plant, lasting for weeks in the summer season. Well suited to greenhouse and conservatory. Start them in March. A gem of a thing for wire hanging-basket. Easy to manage and inexpensive. Introduced from Mexico about 1544.

I will now speak of the *Amaryllis*. Congenial conditions of climate and soil produce magnificent flowers of large size of what is known in the West Indies as the Barbadoes "Spice Lily." These royal beauties are amongst the most gorgeous bulbous plants grown. Their immense flowers and richness of coloring are simply incomparable. The bulbs are large, 7 to 16 inches in circumference and produce with great certainty majestic spikes of bloom from 18 inches to three feet high, bearing enormous trumpet-shaped flowers, averaging 6 to 10 inches across, of great substance, of rich and glowing scarlet, intensified by contrasting with the wide white stripe through each petal. When in bloom in winter and spring months no flower can approach their beauty. Each spike bears 4 to 8 blooms. Old bulbs two and three spikes in a season. A splendid plant for the house and window garden.

The *Formosissima* or Jacobean Lily, a quaintly-shaped beautiful flower of this species grows well in water like the hyacinth, or in spring, can be planted out of doors where it will bloom well. Of a dark red color.

The *Belladonna Major*, a fall blooming variety of extreme beauty and great fragrance. Large spikes 2 feet high bearing from 6 to 12 beautiful flowers, sweet as violets, white suffused with pink. A garden gem.

Then there are of less importance *Amaryllis*, *Atamasco*, *candida*, *rosea*, *Zephyranthes*, *Sarniensis* and *purpurea* or *Vallota* and *Leopoldii*. These plants are natives of South America and should therefore always be planted in a sheltered position after all danger of frost is over. Not particular as to soil, only that it should be well worked up and manured.

Alströemeria. Here is a genus little grown containing many charming species. They produce fleshy, tuberous roots, which, being somewhat tender, should be planted at least 8 inches below the surface, in deep soil of loose character. Don't disturb them very often. *Aurantiaea* is a very fine yellow, producing its blooms in July and August. Brought from Chili, 1831.

Anomatheca is a dwarf-growing plant belonging to the Iris family. The corms and leaves are those of a diminutive gladiolus. Flowers blood-red, produced in August and September. 9 inches high. Plant it pretty deep and it will thrive well in any light garden soil. South Africa, 1830.

Brodiaea, *grandiflora* and *coccinea* are very handsome, bulbous plants with somewhat long leaves deeply cut, and erect flower scapes, bearing at the top an umbel of drooping tubular, scarlet flowers, the ends of the perianth segments tipped with green. They are very showy and distinct and bloom in September. California, 1870.

Anemones. The anemones has long been a favorite flower in our gardens, and with the florist especially it has proved one of those subjects on which he has bestowed great pains in the direction of its improvement. Years ago in the old land it was much esteemed as an exhibition plant, but its cultivation has declined of late, not because it has lost any of its decorative value or beauty, but in consequence of the introduction of other popular plants to general cultivation. There are two sections, the double-flowered and the single-flowered, which with care will bear our climate, with protection, excepting when we

have seasons of unusual severity. Roots planted in October flower in May. Those planted in January about June. They can be had in almost every color and are very desirable. Plant in ordinary gritty soil with vegetable manure. Cover 3 or 4 inches deep with half-rotted leaves to protect from the frost. When buds appear in the spring apply a top dressing and water freely. Apennina, Joan of Arc, Ceresè primo, Eugenia are among the best colors.

The Crocus, Elwes' Giant Snowdrop, and *Chionodoxa* (or Glory of the Snow,) *Camassia*, or Quamash of the Indians, with *Ixeas*, *Sparaxis*, *Scillas*, *Ranunculus*, all perfectly hardy, dwarf-growing, beautiful, early spring flowers, too well known to need further mention, should be more largely grown than they are in clumps anywhere almost, but more especially as a first border plant next to walks. The Lily of the Valley also, should not be so generally neglected as it is.

Then come the taller-growing varieties of bulbs for the next line in the border.

The *Ornithogalum*. A beautiful growing variety throwing up large spikes of white flowers, star-shaped with a black centre, having a very distinct perfume. Equally good for greenhouse and window culture; easy to manage.

Next we may mention the *Jonquils* the Daffodils, the Narcissis, Polyanthus, etc.

Dutch Hyacinth, single and double.—These naturally fall into the next line and are exceedingly fine with their large trumpet-shaped flowers—smaller ditto, some with two colors, some with only one, some single and others double, delicately scented and a joy for ever.

Shall we pass by the lovely Iris with all its pencilled, flaky grandeur inviting us to stay and take a little pleasure? We cannot forego the enchanting scene of these flower-winged beauties. They are among the loveliest flowers in the world. There are many types of the English, the German, and the Japanese. Some grow but about 12 inches high, some 18 inches. *Anglica*, *Bakeri alata*, *Peacock* and *Florentina* are amongst the best, but *Iris Loretti*, a native of Palestine, is the finest perhaps in the world. Coloring very fine. The drop petals show a creamy ground color, dotted with crimson—purple spots with richly colored veins centering into a dark crimson—purple signal. The uprights are nearly pure white, marked with pencillings of violet lines. A very vivid red-yellow tinting of the styles gives by reflex a reddish lustre to the standards. A charming thing.

Japanese. But of course, the Japanese imported hybrids will now be specially popular, as they well merit. In doubles and singles their magnificence surpasses description by me. Enormous in size, measuring 8 to 10 inches across, and of charming pencillings and tintings—one color being suffused with another throughout, like the blendings of the rainbow. They are very hardy and attain perfection in a moist soil and will glorify your gardens in July and August.

Next in order are the matchless Lilies, in our hardy bulbous plants, for their lovely form and delicate colors. You may have them flowering from May till September and they cannot be overrated to mix up with Pæonies, single and double, Japanese and others.

Chief and best of them are: *Madonna Lily* (or *Candida*) white; *Canadense*, yellow spotted; *Red C. Flavum*, delicately scented, pure yellow; *C. Rubrum*, red, darker spots; *Calcedonicum*, etc., upturned.

For greenhouse cultivation and window decoration: *L. Harrissi*, *L. auratum*, *L. longiflorum*, *L. Krameri*, *L. speciosum*, *rosa*, *rubrum*.

TULIPS AND HYACINTHS. For spring bulbs for massing in beds no class equals the Tulip and the Dutch Hyacinth. Circular beds look best in quarter sections, of solid color; oblong beds in lines of distinct shades and markings; clumps in general mixtures. These should be planted in our rigorous climate, at least 4 or 5 inches deep.

Of Dutch Hyacinths, closely planted, a pretty circular bed can be had with lines of white, pink, blue—in their various shades. Plant in a sunny position at least 5 inches below the surface. Scatter litter over the bed in early spring, after the snow has left, to prevent harm from frost damaging the early budding plant.

These all with Roman-grown Pink, Dutch-grown White Roman, pink and blue, can be had in bloom in pots for the window and conservatory from December till June. Drain

the pots well 1 inch, keep on hand a supply of soft wood charcoal, place this next the drainage, in pieces as big as walnuts, placing the bulb in compost made of decayed turves, a pinch of leaf mould, not too much well-rotted cow manure, leaving the point of the bulb well above the soil. Put in a dark, cool place till the growth of 1 to 2 inches, then gradually bring to the light. Keep moist always. Tulips same treatment. Miscellaneous bulbs of exquisite beauty and fragrance for house cultivation made be tested almost *ad infinitum*, but we cannot forget the delightfully fragrant Freezia, white and golden. Grown much in the same way (10 in a 4 in. pot) as indicated for the Tulip and Hyacinths.

Oxalis. Still another little dainty thing so easy of growth and luxuriant in foliage, as the *Oxalis*, claims our notice. For a small table plant for the supper and dining room centre-piece can rarely be had with the same grace, compactness and beauty as this in white, blue and golden, small; and the new Bermuda, a perfect gem in yellow, large and fragrant. These with me are great personal favorites. They are very cheap and multiply rapidly. Thrive in any ordinary soil, rich and free. With good cultivation the German hybridist at work in Bermuda tells us that single bulbs have produced 75 stems at a time bearing over 1,000 blooms in one season. Try it and you will be pleased.

Nerine. Again, don't be shy of the "Nerine" of Guernsey Lilies, the Crimson Kirkii and Americana.

Cyclamen, or "*Alpina Asperule*" is a most beautiful and highly interesting winter and spring flowering bulb equally well suited to the window and greenhouse. Flowers are unique and foliage very ornamental, making it a splendid decorative plant. This family have of late years been very much improved, so much so that the small comparatively insignificant blooms that used to be met with bear no comparison with the splendid large, broad-petalled, distinctly-colored forms of this flower now so plentiful! This change has been effected through the perseverance of a few of the London florists (now taken up by the Germans) who, raising new varieties and studying the nature of the plants, adopted an entirely new course of treatment from the old practitioners who periodically dried of the corms almost to complete softness. I have made a specialty of growing these plants for 6 years in the latest improved strains, the Giganteum and Grandiflorum particularly, and from the testimony of others, with measurable success, and I know of no medium-sized plant that will add so much to the floral display all through the winter as the Cyclamen, when well managed. To obtain the best seed from originators one has in the business to pay as high as 2c. per seed, and we had the readiest sale to dealers of our own seed product at 1c. per seed. Innumerable shades are now obtainable and blooms of great breadth and substance, the petals sometimes measuring $2\frac{1}{2}$ inches deep. Seed sown in 1892 produced for us two decided novelties, one a pure white with a fragrance stronger and much more pleasant than that of the Sacred Lily, the other being intensely deep red with two-thirds black in color. We had also 5 or 6 plants with 9 and 10 petals. Our best specimen without extraordinary means carried, as near as could be counted, 225 blooms and buds at once, this being the largest one year old plant I ever saw.

The best time to sow the seed according to my experience is in October. Ordinary seed-boxes should be prepared by draining them and filling them with an equal mixture of turf loam and leaf mould well baked, a little sand being added; slightly cover the seed and put the boxes in a temperature of 50° and as soon as the seed appears put them near the glass to prevent them being drawn. When large enough to handle pick them out into larger boxes similarly prepared about 2 inches apart and keep them during the winter in a similar temperature and position. In the spring put into 3 or 4-in. pots, and as the days increase their length shade them from the sun's bright rays, as they cannot stand its full force. Pursue the same course till in their flowering pot, watering and attentively giving them air. In potting do not cover more than the lower half of the corm with soil, if you do trouble will follow. In the summer time they like a not over strong shower bath occasionally. This will help to keep down *their enemies the red spider, thrips and green fly*. If these are allowed to continue their ravages the plant cannot make good progress. To

flower them satisfactorily they must be kept hustling without a thing to check them. In the fall give them full light in an open space, give plenty of air at a temperature of 50° and your pains will be amply rewarded.

You will get a few blooms in November and they will continue increasing in number and size till February and March, when they should be in their full glory. After this their striking distinct color fades somewhat and in summer they will begin to tell you they want to rest, when they should be put in a shady position and water partially withheld, but do not dry them up as they did in the years gone by, little knowing their requirements at such a time. In the fall, again move into the larger pots, shaking some of the old soil from them, using similar soil to that before recommended and continue to care for them as heretofore. They will this season bloom much earlier and make fine displays, though the individual blooms may not be quite so large. The plants will live for years, but three years is long enough to keep them, younger stock being preferable. Don't fail to grow at least a few.

Gloxinia. To return to this family. If we take into account their neat habit of growth, their distinctness, their continuous flowering habit, the exquisitely gorgeous colors they possess, and the ease with which they can be grown it will easily be seen that there are few warmth loving subjects so well deserving of attention as the *Gloxinias*, which represent a genus of gesneraceous plants from the originals of which, imported from the warm regions of South America, have sprung the large family of charming hybrids now in existence. They flower continuously during the spring and summer, and are invaluable for decorative purposes; the blooms are also frequently used for cutting. They can be easily raised from seed sown in good time in the spring, following precisely the methods as with *Cyclamen*, only that they must have a temperature 60° to 65°, just keeping the soil nicely damp.

The methods of propagation we cannot stop here to go into.

We have also as a specialty of the family about 200 of *Nægelia grandiflora*, *Longiflorum alba*, which is a delicately scented blooming plant bearing its pure white flowers in pairs on stiff reddish stems about 15 inches high, each stem producing from 6 to 10 blooms. It is in its best condition about August to November and is very simple in its requirements. This I expect I have disposed of to an ever wide-awake Scotchman who like his fellow clansmen usually knows a good thing when he sees it.

Your patience, I am sure, will by this time be exhausted and I feel very much indebted to you listening so patiently to the crude thoughts of one who classes himself a novice amongst the novices in the presence of so many distinguished professors, specialists and learned gentlemen.

That you may not think I have no appreciation of the many beauties and merits of the lovely *Gladioli*, *Lemonie's* and others, I would say each year seems to bring fresh revelation of charming blooms having rich suffusions of colorings and markings that surprise me. They are so cheap too that all should grow them.

After some discussion upon Mr. BACON'S paper it was decided to change the programme in order to allow time for the drive and visit to the asylum on the morrow.

The PRESIDENT therefore called upon Mr. Caston to briefly deal with the question,

HARDY FRUITS FOR NORTH SIMCOE.

Mr. G. C. CASTON, of Craighurst, said: I don't know whether it requires altogether hardy fruits for North Simcoe after what we have heard about the Beaver Valley and about peaches growing around Collingwood, and after seeing the specimens of fruit which have been shown here. I might first mention the interesting fact that this is the oldest agricultural and fruit growing section in Canada. Agriculture was carried on to a certain extent here two hundred and seventy or three hundred years ago, and the first fruit planting was done here at that time. We learned from Parkman's "Jesuits in North America" that this part of Canada was the home of the Huron Indians—the only Indians inhabiting North America who practised agriculture—and in clearing up this country we have evidence of the old corn hills—they grew Indian corn—and at that time there

were 20,000 inhabitants of these Huron Indians in the county of Simcoe, while the Niagara Peninsula was inhabited by the Iroquois that were constantly at war with the other tribes. That may account for the savage nature of some of those inhabitants. At that time a number of plum seeds and other fruit were planted by the Jesuits around the shores of the Georgian Bay, and anyone who travels by stage from Parry Sound to Burk's Falls will find a number of those plum trees growing there yet—not the original ones, but ones that have sprung from them; they have perpetuated their species. While in Parry Sound I was shown a sample of plums that were grown on some of those wild plum trees, and they are a good deal better in quality than some of the plums we are importing now from other countries and trying to grow as hardy plums. The planting of those seeds three hundred years ago was the first planting that was ever done in Canada. There has been a common idea that we could not grow anything up here except the Siberian Crab or a seedling apple; and I just want to mention a few varieties that succeeded well here, and if I had time I could show you that we can grow any apple in this county that can be grown anywhere else in Ontario—(hear, hear)—and we can grow apples in this county in certain varieties that will challenge comparison with the best apples in the world. (Hear, hear and applause.) I have an apple here from the village of Stayner, that Mr. Pettit, the World's Fair Commissioner, thinks is a Newton Pippin. In the Liverpool market that apple is sold for three times the price of any apple that grows there. (The specimen was cut up and passed round.)

Mr. CASTON: Here is another apple handed me by Mr. George Street, west of Woodburn, on the shores of Kempenfelt Bay, and he calls it the Beauty of Kent; it is of high quality as a dessert apple. In picking nearly a thousand barrels this year, my pickers found only one barrel in the whole to discard. Here is another apple that we have heard a good deal about of late years—the Blenheim Orange. A gentleman living out on the Orillia Road has an orchard of them doing well and bearing well for a number of years. It may not be of very high quality, but it is a very handsome apple, and entirely free from the attacks of the fungus, and it is of even size. It is an apple that would be of great commercial value. This sample was grown at Craighurst. Here is an apple that is going to be a valuable one for this part of the country. It is called the Mann. I think they are pretty near as good an apple as the Greening. They keep well and bear well, are not subject to many of the diseases, and are hardy. Then here is another apple I picked a good many of this fall—the Fallawater. It is a splendid cooker, keeps well, looks splendid in the barrel, free from fungus scab, and is altogether a valuable variety. I have the King of Tompkins, and there is now hardly a living tree; it is too delicate for this section; but by top-grafting it on some hardy stock you can keep it. I have been experimenting along that line for some years, and here is the result of some experiments. We have heard a good deal of the influence of the stock on the graft. Now, these have been grown on a sour seedling. I would like the experts to say whether there is any difference in the flavor of this King, and one grown on its own stock. (Samples distributed.)

Mr. MORTON: There is a distinct difference in the flavor. The larger one has a great deal more of that aromatic flavor that is peculiar to the King. I can distinguish it in the smaller apple, but it is less distinct.

Mr. CASTON: We can grow any apple that can be grown anywhere by grafting it on a hardy stock. I have another apple called the Gideon. The tree of that is one of the healthiest growing trees I know of. It has the healthiest foliage, a nice smooth, bark and dark, rich green foliage peculiar to these trees. It is not affected by the scab at all either in the foliage or in the fruit. It is a very handsome apple where the tree is kept properly pruned, for it has a nice red cheek on it. I have merely touched upon some of these fruits that we are able to grow in this section.

Mr. A. M. SMITH moved that the papers which have been crowded out for lack of time be considered as read and incorporated in our report.

Mr. McNEILL seconded the motion, which was carried.

Mr. BEADLE read a series of resolutions of thanks, which Mr. Race seconded and which were carried unanimously.

Mr. WHYTE said : I am sure we would all listen to Mr. Race for ten or fifteen minutes on the subject of Roses for Out-Door Culture.

Prof. CRAIG : There was a special question as regard to that subject.

The PRESIDENT took the sense of the meeting, and it was decided to hear Mr. Race.

ROSES FOR OUT-DOOR CULTURE.

Mr. T. H. RACE said : At the outset I wish to state that there is a mistaken idea in regard to the trouble of perpetuating the rose. There would be no difficulty in growing and very handsomely blooming the rose in this town. When I bought my present premises in Mitchell twelve years ago, a lady quite distinguished in floriculture said it was impossible to grow roses there, but I said to her just this, "It has been written by a man before our day, that in order to have a beautiful rose in your garden it is first necessary that you should have a beautiful rose in your heart." Now, I leave it to any lady or gentleman here if love will not remove any obstacle that has ever presented itself in this world—not only the love of man for a woman, but love for a rose. If you have a rose in your heart you will overcome every obstacle and produce a beautiful rose in your garden. There is no more trouble in raising roses than any other house plant. I am not going into the varieties of roses that I have, because I must have one hundred and twenty or one hundred and thirty varieties in my garden, but I should like to have said something about the social, moral and religious influences of the rose and all other things. I don't spend any time at all in the house during the summer time. I go out into my lawn with my papers and my books and sit down there with my roses round me, and I never feel alone, because there is society for me in the roses. If you wish to start with a few roses, the first I would mention is the General Jacqueminot. It is a little loose in its make-up. The color is everything you can desire. The growth of the plant is very rank. The formation of the rose is a little bit loose unless you keep the plant very richly manured and well pruned back. It is a rank and rampant grower. You can give it all the growth that it will take, but prune it down well in the spring if you want it to bloom well and form well. You can prune it down so well that it will produce very handsome blooms and any amount of them. There are a great many varieties of dark-colored roses very similar to that one. If you wish another take the Fisher Holmes ; but if you wish to take half a dozen dark roses, take that half dozen in the General Jacqueminot. Now, for a white rose take the Madame Plantier. It has one fault—it has only one season for blooming, and that a rather brief one, but it is a beautiful rose for the time that it lasts, and it is no trouble to cultivate. Prune that down well and it will give you a very heavy mass of bloom. Now, in order to make up nice bouquets, you want a perpetual White Moss. That is a rose that you can grow anywhere and that will sucker ; if you get one plant of it you will have any amount of plants in a year or two to distribute among your neighbors. The perpetual White Moss rose is perpetual only in one sense—that it is perpetually out of bloom. (Laughter.) You cannot get it to open out except under very exceptional conditions ; but you don't want it to open out. It is a very rampant grower. Prune it down well in the spring and it will give you just a solid mass of the most beautiful buds that you desire, and very heavily mossed ; and it is only for the buds that you want that rose in making up your bouquet. Now you want another one, and take the Glory of the Mosses. I would just as soon have an old common English or Irish rose as any other, but it is not such a rampant grower as the Glory of the Mosses, so I will give you that one. That gives you four roses, and with those you can very well afford to start, and I know that you will be pleased with those. Now, all they want is a good, loose soil, clay loam and plenty of manure, nicely protected in the winter time. If you have plenty snow here just allow the snow to press around them, because there is no better protection than snow drift ; but if you have not plenty of snow bend them over and cover them with leaves or clean

straw, and then in the spring prune them down well, and you will have no difficulty. Now, I will add another one, rather pinkish rose, that is the Magna Charta, a most beautiful English rose, a heavy bloomer. It has the same fault as Madame Plantier, that it has a short season, but it is a magnificent bloomer forth the time it does bloom. However, if after the first blooming season you trim it down well, cut out all the old stocks, manure it well, and allow the young shoots to grow up, and it will give you a second blooming season. In August, this year, I had nearly all my magnificent Charta bushes in heavy bloom, and you can get very nice blooms in that way. That is quite enough for you to begin with. General Jack will give you bloom throughout the season, even up to the time the snow falls. With regard to the care, you don't require to do anything with your roses except to spray them occasionally with Paris green water, not as strong as you would use for other plants. I don't know whether the Bordeaux mixture does any service at all to the rose, but this I am sure of, that the lime in that mixture would destroy the foliage, and I place a great deal of value on the foliage of the rose bush as well as the rose itself; and the Paris green leaves no injurious effect, no blemish on the leaf. Now, if you have mildew—I may say that there is such a thing as mildew of the rose if you plant your roses in a soggy soil or in a partially shaded position—the Bordeaux mixture would probably do something as a preventive for that, but there is a better one. Get your roses out of that position, for they have no business there. Never plant them in a soggy soil, and if you don't do that you will not have mildew. You want to have your roses in a porous soil; keep it nice and clean; give it plenty of sunlight and air, and you will not be troubled with mildew, therefore you will not need any such fungicide as that; and treat it as I have stated with a little Paris green several times during the summer and that is about all the care that your roses will require, and I know that if you do that you will be delighted with the results. (Applause.)

A DELEGATE: About what quantity of Paris green do you put to a gallon of water?

Mr. RACE: I put two teaspoonfuls to an ordinary pailful of water—not heaping teaspoons, just a teaspoon level full.

Prof. FLETCHER: I would like to protest against that measure of a teaspoon. The teaspoon may vary all the way from one third of an ounce to over an ounce, that is by actual measurement in weight. On one occasion I went into the laboratory where some of the officers of our farm get their lunch, and I collected all their teaspoons, and the extent of difference from the largest to the smallest was from one third of an ounce to an ounce. An ounce of Paris green is a large quantity, as you will find if you measure it up. Mr. Race mentioned an enormously strong mixture for roses or anything else. That is strong enough for potatoes. I think it would be better for you to go to your chemist and ask for a quarter of an ounce to be measured up by their delicate scales. A quarter of an ounce would be certainly enough for three gallons of water on roses for the saw-fly larvæ.

Mr. RACE: I use a small teaspoon and I simply level it.

Prof. FLETCHER: These rule-of-thumb measures are very dangerous and give us a great deal of trouble.

Mr. RACE: I wonder if there are any ladies in this town who are trying to cultivate the rose in the house? I would advise them to put those roses right out-doors into a nice soil in the summer time, and they will be more pleased with them there than almost any other plant they can put there, and they will bloom almost constantly during the summer time. In the fall cover them up with leaves and let them stay outside all winter. The foliage will die and blacken, but the root will be quite healthy in the spring, and as soon as the season opens they will sprout up again and give you constant bloom. Two weeks ago last Monday I went into my own garden and picked a very large bouquet of that variety of roses after the first heavy snowfall. I mention this simply to show that the house rose will bloom up to the time that the snow buries them.

Mr. FOWLIE, President of the Orillia Horticultural Society, was called to the platform, and assured the delegates of the pleasure with which they had been welcomed to the town, and the profit that had been received from the meetings. On behalf of the local society, he tendered their thanks to the Association for accepting their invitation, and he hoped it would be only a short time before they would return. (Applause.)

RESOLUTIONS.

The following resolutions were brought in by the Committee on Resolutions, and were heartily passed by the Association.

PROFESSOR PANTON'S LECTURE.

Resolved, That the thanks of the Association be given to Professor Panton for his very valuable and instructive lecture on the fungi. We desire to express to him our grateful appreciation of the great kindness shown to us by him in coming to our meeting and entertaining us for an hour at so great inconvenience and with such entire self-forgetfulness.

EXPERIMENT STATIONS.

Whereas, The Board of Control of Experimental Fruit Stations for the Province of Ontario have selected experiment stations with experimenters as follows: at Trenton, W. H. Dempsey, experimenter; Craighurst, G. C. Caston, experimenter; Winona, M. Pettit, experimenter; Leamington, W. W. Hilborn, experimenter, and whereas the appointment of experimenters is subject to the approval of this board,

Resolved, That this Board of Directors approve of such appointments.

MR. PATTULLO.

Resolved, That the thanks of this meeting be given to Mr. Pattullo, of Woodstock, for his generous response to our request, and for his able and interesting address on the very important subject of good roads. We desire also to express our sympathy with him in his efforts to secure this great boon, so essential to the best interests, economical, social and ethical of our rural population.

HIS WORSHIP, THE MAYOR.

Resolved, That the thanks of this Association be tendered to His Worship the Mayor, and to the citizens of Orillia and vicinity for the very courteous welcome given to us, and for the great interest shown by them in the work of the Association, as manifested in the exceedingly beautiful and creditable display of the winter fruits of this region, and by the magnificent entertainment provided for our evening meeting.

ORILLIA HORTICULTURAL SOCIETY.

Resolved, That the thanks of this Association be tendered to the President, Secretary and members of the Orillia Horticultural Society for the hearty and courteous reception accorded to us by them, and for the great trouble taken by them to render our meetings a success. And the Association desires to express its satisfaction at the highly intelligent interest taken in horticulture by the people of Orillia and vicinity, which is largely due to the fact of their having such an excellent organization in their midst.

PRESS.

Resolved, That this Association desires to express its appreciation of the press of Orillia in co-operating to make our meeting a success by its judicious and kindly notices, and also in extending the usefulness of these meetings by its concise reports; and we also take the opportunity to thank the Press of Ontario in general for its unvarying courtesy towards our Association.

The proceedings were closed by the meeting singing the National Anthem.

VISIT TO THE ASYLUM FOR IDIOTS.

On Friday morning the delegates were driven to the Asylum for Idiots under the escort of a deputation from the municipal council of Orillia, accompanied by the editors of local journals and other prominent citizens. The visit to the various departments of the institution was most interesting and instructive, and the impression left upon the minds of all the delegates was one of gratitude that those mentally afflicted were in charge of such able and enthusiastic instructors and managers as Dr. Beaton, Miss Christie, Miss Lafferty and others.

Luncheon was provided at the conclusion of the visit of inspection, and at its close short addresses were delivered.

APPENDIX I.

THE PACKING AND MARKETING OF PEACHES.

By W. BOULTER, PICTON, ONT.

In taking up and endeavoring to solve one of the difficult problems of my subject will try and handle it from both the standpoint of seller and buyer. In first place the peach growers of Ontario had a bountiful crop the past season, probably never equaled in any previous year, while our neighbors at the south of us had a very poor crop, and we saw what not usually happens, "Canadian peaches" finding their way in considerable quantities into the "American" markets. We understand they enter there duty free now, which was no doubt very beneficial to our growers here, leaving our neighbors over there to candidly judge of the benefits of "Free Trade *vs.* McKinleyism" in the peach trade. I have started a large canning factory in Toronto this year, and in doing so I wished to be in a favorable position as to locality to obtain peaches, and also pears, plums, and other fruits, which are sent in such large quantities to market here, and to be able to compete with California fruits. At the revision of our Canadian tariff last session of Dominion Parliament the Government—for what reason none of us engaged in the fruit packing, as well as the growers can conceive of, as they claimed to make a farmers' tariff—reduced the tariff on canned fruits and vegetables, thus allowing California peaches which as you all know are grown in abundance there to be brought in here, thus making a slaughter market of their goods here. Our own Canadian peaches, I believe, are equal if not superior in flavor of any grown on the continent, and we had virtually driven California peaches out of the market. We with other packers determined to hold our trade if possible, knowing we had a favorable climate for fully maturing the fruit. We placed ourselves in communication with the largest commission houses in Toronto to supply us and to send us only the choicest fruit from our best growers. As soon as the fall peaches came on we commenced receiving them, but must say we could depend upon getting scarcely any uniform peaches, the tops of the baskets being faced beautifully while the centre and the bottom would be filled up with small and worthless stuff, such as wind-falls, clingstones, etc., and we very seldom could get them to run uniformly. We called our commission men's attention to the fact—w.h.o., mind you, had promised to supply us only with first-class fruit and to take back what was worthless. So confident were they that they could control their packers—they repeatedly wrote expostulating in strongest terms, still the peaches would come on very little better. Knowing some of the growers personally I wrote them of the facts, and all the satisfaction I could receive was the proverbial "hired men would not do as they were told." We were obliged to put up a large portion of them in what is called "Pie Fruit," and sell for what we could get. I also saw thousands of baskets shipped off by express to different parts of Canada, and personally I know these caused much dissatisfaction by reason of the way they were packed, and prices as growers well know, dropped away down, and our fine crop of peaches did not bring to the growers as much as they should. This has been my experience as a buyer. I am also a large grower of fruits on my farm in Prince Edward county, and know that those engaged in fruit growing after years of waiting look for some returns for their expense, and know also that it is not pleasant after getting a good crop to have to sell it as it were at a sacrifice; but I wish to impress on growers who perhaps feel annoyed at the commission men they have sent their fruits to, and feel that they have been imposed upon, that I do not think this will be borne out on investigation, as the commission man depends upon his sales for his living, and endeavors I believe to get for his customers all they can. The old law of supply and demand and quality must rule in all cases. And when growers will persist in mixing up the good with the bad, the small with the large, they must expect poor results. First pack your peaches, if possible, uniform in baskets, and discard those baskets with thick wooden bottoms that weigh from three-quarters to one pound more than those not having them. Also put only your choicest together, commencing at the bottom of the basket and so on to the top. *Pack each variety*

by itself. Don't put in a few "clingstones" with good kinds just to work them off. Also put your seconds uniformly in size by themselves, using all the care possible and cover nicely putting your name in each basket. Now you will soon be surprised how prices will jump up for such peaches. But you will say it would be labor lost, if all did not follow this rule. I say "No," emphatically. Nothing will pay you so well as to put up your peaches first-class. Recollect as growers you have a heavy protective duty of one cent per pound on fruit and on the basket, which is the highest duty per cent. I know of. So unless more care is taken by growers you may find some day not far distant this duty may be reduced materially. There is very little area in Canada for peach growing, as you all know that east of Hamilton very few if any are grown. Thus the demand for this luscious fruit can always be maintained, and, if more care is only used in marketing it, the result will be a better remuneration for your labors and it will be a pleasure for your commission men to handle them. Look at our Canadian apples and the high reputation they have in England and over the whole world. It is by our buyers insisting on packing only the choicest fruit possible, discarding all small and worthless ones. Now I have not a doubt but that there are as honest peach growers as in any other business, and I do not wish to cast any reflection on those, but, if possible, to strengthen and uphold them in their endeavors to put up only first-class goods; and I trust if we have another favorable year that our growers will use more care. I candidly say from years of experience in buying fruits that we can produce as fine flavored fruit, and even better than I have bought from our neighbors south of us. Let your motto be "to excel," and always bear in mind when packing your peaches they shall be put up right, and to recollect how you personally would feel if, like the mechanic who buys a basket to carry home to the good wife to put up, you found on opening them that one-half were worthless. What would you expect him to say?

BEE-KEEPING AND HORTICULTURE.

By J. R. HOWELL, BRANTFORD, ONT.

The true horticulturist, like the successful bee-keeper, is an enthusiast. I need not remind any, who plant trees and grow fruits, of the genuine pleasure that thrills the soul when nature responds to his intelligence, thought and careful direction. But after all man's skill in planting, after ransacking the earth for improved varieties, after propagating, grafting and hybridizing, he must rely mainly on nature's methods of fructification. The favoring winds and industrious bees are needed to fertilize the bloom to insure a harvest of fruit. As a means of accomplishing this end, there is no question that the bee is of great service to the grower of fruits. Observant horticulturists have estimated that our fruit crop is increased one-third by the cross-fertilization of flowers by the honey bees. No other insect is multiplied in such vast numbers so early in the spring when their agency is so much needed to fertilize the orchards and small fruits. If the winds were the only means of carrying the pollen from flower to flower, how often would perfect fertilization fail from too much, or too little, wind during the brief period when the bursting buds are sighing for the life-giving dust from the neighboring flowers? Not only is honey provided in the delicate flowers to entice the bees, but the pollen so essential to the plant (and just as essential to the bee in furnishing the proper food for its young), is placed in close proximity to the nectar, so that in getting the latter the bee is unwittingly carrying the dust from flower to flower, working out the wise plans of Providence as relates to plants. The drop of honey is placed in the flower not because it is needed to perfect the flower or fruit, but to tempt the bee to brush her hairy legs against her anthers, and distribute the golden dust. So the bee introduces itself at once to the horticulturist as his friend. What then is there to hinder these two vocations from going hand-in-hand since each is helpful to the other? They ought at least to be on friendly terms. And now, in conclusion, my horticultural friends, remember that the busy little bee is your friend and co-worker. She multiplies your fruits, she gathers the richest of nectar to tickle our palates and soothe our lungs. She toileth early and late; and at the close of her brief but useful life she asks neither grave nor monument.

THE VEGETABLE GARDEN.

By W. WARNOCK, GODERICH.

Where circumstances permit a choice situation a garden ought to be as fully as possible exposed to the rays of the sun, and in Ontario, or this latitude, a gentle slope to the south, southeast or southwest is preferred to a level surface; but a slope to the north is by all means to be avoided; a deep rich and easily penetrable soil is desirable and the soil should be three feet deep for the best results. It is often important to trench to get a uniform depth of soil, and it should be plowed or dug in the fall. A liberal supply of manure is necessary for a garden; the kinds of manure must be accommodated to the soil and to the different plants, and often depends in part on other circumstances. Care must be taken not to overdose with guano or indeed with strong manure of any kind, by which plants might be killed rather than nourished. Care should be taken that each crop is succeeded by one of a completely different kind, a rule which is indeed always, as far as possible, to be observed both in horticulture and agriculture. It is also of great consequence to have the means of irrigation, or at least of abundant watering, which even where the climate is generally moist greatly tends to increase the produce in dry seasons, and is almost always necessary to the perfection of certain crops. This use of water is far from being so common as it might be in Ontario gardens. I will make one reference to manure and its effects on soil to get the best returns; we will give requirements for tomato culture as this is one of the most important vegetables we should cultivate. It needs a quick fertilizer; it is a gross feeder; to prevent it from growing too much to vine and ripening a small crop late in the season, the best conditions for an abundant and early ripened crop is to plant on a sandy loam, made rich through previous manuring for other crops of vegetables. Work it two or three times before planting time, then just before planting sow broadcast nitrate of soda at the rate of six or seven hundred pounds per acre, plant only good stocky plants, work the soil often, once a week at least, and you may expect a good crop, ripening early. Do not under any circumstances apply a fertilizer that is slow in giving up its substance. Fertilizers applied late, or which give up their substance late, give poor results because they delay fruitfulness and the plant is overtaken by frost before it yields a satisfactory crop. Nitrate of soda applied at one time early in the season gives a much heavier yield than the same amount applied at intervals. Now we can easily see a reason for treating some plants different from others with respect to fertilizing the soil. The tomato, if cultivated properly, commences to give up its fruits long before its season is over, hence the need of a quick fertilizer; whereas the turnip, carrot, and potato continue to require a greater amount of plant food to the end of their season. The strongest point in horticulture and gardening is the man, he is the main factor, the one that needs to rise above his association. He must be a close observer of facts and results, able to trace cause to effect and effect to cause; he must read as well as think and that carefully; he must learn how to propagate, how to cultivate and how to fertilize; he must learn how to combat the army of insects that prey upon many of our most useful garden vegetables, etc. Take man out of horticulture and gardening and it will return to where he first picked it up, to the wilds and jungles of nature, where he had to find it, after he had been turned out of the garden God placed him in at first. A lengthy description of how to plant, cultivate and fertilize even a few of the many useful vegetables would be out of place in this paper, for there is a number of valuable books published on gardening and all who wish to improve their knowledge in this line can avail themselves of this opportunity. The chief obligation resting on us as horticulturists is to impress on all the importance of having their vegetable garden as well as some plants and trees for their attractive beauty, for there is through the farming community a great many that feel they have no time to attend to a garden and are deprived of the great benefit of a varied vegetable supply of food, and in the towns and villages and even the cities there are many that can have a supply of vegetables in their season if they would

only try. Now I will show what a man can have if he has only two square rods of land suitable for vegetables. Here he can have a nice supply for a small family, of rhubarb, beets, and parsnips. Here are only three varieties of vegetables and not comparing them with the potato they are in my opinion the very best collection you can plant in your small plot. The great point in their favor is that no insect pests trouble them. Rhubarb requires very little care and is both fruit and vegetable. It is the first thing in the spring and remains all summer. A great many do not know the value of beets. The young plants require to be taken out of the bed in thinning to a proper distance; they make the very best greens for early summer and when the roots get larger and even full grown it makes a vegetable dish, when boiled tender and cut up fine, that everybody learns to appreciate who has had the privilege of testing it a few times. It is much more wholesome than cabbage, and a great deal more easily grown. Then the parsnip comes in for winter use and lasts till rhubarb is ready in the spring, with very little trouble in storing, as it remains in the ground all winter and is taken up as wanted, until the middle of April. Then take up the balance, and they will keep in a cellar for six weeks. It is also the heaviest cropper of all garden vegetables, only requiring deep, rich soil to make it the most satisfactory crop in quantity. Now for a garden where a man has time on his hands to dispose of and who has a home and family. He should have his vegetable garden as well as the flower and ornamental plot. It only needs to be started and its pleasures, not counting its usefulness, repays all who are not in an active business life. For instance, the fall agricultural and arts exhibition comes round, and you can go into your garden and cut a cauliflower that weighs 20 lb. white and perfect as if it was carved out of alabaster; you can pull up parsnips six lb. in weight; and find great pumpkins, and a squash or two, weighing over three hundred lb. Now you feel a high sense of pleasure because you know you have made these grand specimens of vegetables through the work you have so patiently bestowed on them. Now this is the sphere in which a man should live whatever occupation he follows, he should work to make new developments; and in the vegetable kingdom the field is larger than any other, as a great part of the vegetable kingdom has been created for man's food. So our duty is to improve upon what we find in nature and it is of great importance to have a unity of feeling on the great benefit of a higher knowledge in vegetable growing. The field is large and there is room for united action such as will tend toward the dignity, honor, pleasure and long life of man.

GARDENING.

BY J. CUPPAGE, ORILLIA, ONT.

As in designating our various spheres, our Secretary has assigned to me general subjects. I shall try to occupy my allotted ten minutes by saying something about gardens in general, and a few minor topics in particular.

Gardening is the most ancient, natural and healthful of all employments; for we read that God Himself planted the Garden of Eden with fruit trees, plants pleasant to the sight and good for food, and herbs bearing seed. Our first parents were placed in this garden to dress it and to keep it. Ever since it has been the employment which brings us closest to the beauties and luxuries of nature, and when we neglect or ignore its pleasures we are departing from the pristine perfection of humanity.

As Miss Hodge, Mr. Bacon and others are better qualified to deal with flowers, climbers and ornamental shrubs, I shall merely observe that many of our native plants are well worth cultivation, with the advantage of being thoroughly adapted to the climate, and that between annuals, perennials and available pot or bedding plants, for half the year Ontario justly deserves to be called Florida.

NOTE.—To Mr. Warnock, writer of this paper belongs the honor of exhibiting the largest pumpkin and the largest squash at the World's Fair.—*Secretary.*

In vegetables we fail to take advantage of our opportunities, as comfort and health would both be subserved by a greater variety upon our tables. Too many hold to the old English notion that the vegetable marrow is the best of all squashes, overlooking the Hubbard, Turban and many others, which I maintain to be the best and wholesomest vegetables in the world if properly cooked and used. It is a curious fact that many authorities recommend boiling them like potatoes and then squeezing out the water.

Strange that the tuberous-rooted sunflower, or Jerusalem artichoke, is so little used, as in Britain it is a favorite and excellent accompaniment with roast mutton, as the white turnip (also neglected here) is with boiled mutton; and, seeing that the real European artichoke does not thrive in this climate, the so-called Jerusalem one is our nearest substitute.

As time precludes enumeration of small fruits, I will only note that some wild black currants well deserve a place in the garden, being longer lived, thinner skinned, milder flavored and with a longer and later season than the cultivated sorts.

The dry climate and prevalent mildew make our choice of gooseberries rather limited, and in efforts to originate American varieties it is to be regretted that because its fruit is smooth the low swamp berry seems to have been chosen for the female parent, as its sprawling habit and lack of flavor are serious faults. The other class, with high flavor and upright, tall growth, should have made a better foundation. While berries of some wild varieties are actually too prickly to handle, others are large, good and only slightly hairy. Their peculiar mode of renewal renders them especially long lived, and I have known a plot which after planting received no special care to continue bearing for 40 years.

In raspberries many fine varieties and hybrids have originated from the wild sorts, sometimes even white or yellow; but waste places are now becoming few.

For cherries our chief dependence has been on the old Kentish, but for years it has been sadly affected with black knot, which is tainting other kinds also. The Vladimir and other Russians may soon give us a greater variety of good quality.

In this district it is foolish to strive for fruits unsuited to our latitude, and to grumble because we have not everything. We have enough for variety, pleasure and profit, and there is even advantage in exchanging ours for the productions of other places and climes. We need not try to grow peaches, many of the finer varieties of plums, nectarines, apricots or quinces, but we have other varieties sufficient for all purposes. Pears are as good, and I believe that soon the list of our reliable pears will be doubled, and that we shall even have ironclads of good quality.

The wild plum deserves more attention, as, being native, it is thoroughly hardy, and several varieties are excellent for preserving and good for eating.

Doubtless the mountains of China, Japan and Corea will supply us with many good and hardy fruits and vegetables now that commerce and enterprise have opened up regular intercourse.

In apples the flavors, periods and other qualities are sufficiently diverse. Several varieties are specially adapted to this district, and I have reason to think that very many accidental seedlings if rescued from neglect would prove well worthy of propagation, and not only here, but even on Yonge street and down the St. Lawrence river.

But how to do it is the question. A travelling agent or expert would be too expensive. Perhaps some plan could be devised to offer prizes for seedlings of first and second quality, conditional on supplying so many scions.

It is generally believed that apples do not, or will not, reproduce their own varieties from seed, but I have two seedling St. Lawrences bearing, and perfectly true.

I also know a good Northern Spy, a large tree, free from the usual breaking down of the centre, which grew from a seed sown from 50 to 60 years ago.

In apologizing for this prosy paper, I only hope that these random remarks, derived from my limited observation and experience, may suggest something useful, or start profitable discussion on the subjects we are met to consider.

SOME HANDSOME AUGUST-BLOOMING FLOWERS.

BY D. W. BEADLE, 303 CRAWFORD ST., TORONTO.

The two coneflowers are very showy, well worthy of cultivation in the flower garden. The variety most widely disseminated is the ORANGE-COLORED CONEFLOWER, *Rudbeckia hirta*, (Linn.) It begins to bloom in July, continues through the month of August, and often to the middle of September. The ray florets are of a flaming orange color, varying in length from half an inch to an inch; the cone shaped centre, or disc, is of a deep, rich purple, contrasting most effectually with the bright rays. It is to be found in open meadows and sunny spots on the borders of thickets. The plant is rough, hairy on leaf and stem, grows to the height of one to three feet, often a straight, simple stem but in good soil is frequently branched from near the base. The flower heads are borne singly on long stalks, well adapted for cutting, and last in the water for a week. The leaves on the stalk are few, widely separated, and without petiole (leafstock); the lower leaves are petioled.

The YELLOW CONEFLOWER, *Rudbeckia laciniata*, (Linn.), may be readily distinguished from the preceding by its light yellow rays, greenish disk, smooth stem, branching habit, taller growth, and lacinate (jagged) leaves. It grows to a considerable height in rich, moist bottom lands, but usually from five to seven feet. The ray florets are often two inches long, narrow in proportion to their length, and drooping. Their color is a clear, bright yellow. The heads are borne on long stalks, and keep in water for a week when cut. This species is usually found growing in low thickets, and is specially vigorous in the flats of the Humber river, not far from Toronto.

There are two species of *liatris* to be found growing in Ontario, known in some places by the name of Blazing Star. THE CYLINDRICAL BLAZING STAR, *Liatris cylindracea*, Willdenow, is quite common in the vicinity of Toronto, growing to the height of twelve to eighteen inches; the stem is slender, upright and rigid; the leaves long, narrow, grass-like. The flower heads are set alternately on the stem, in the axils of the leaves, and borne on stout stalks. The form of the flower heads is cylindrical, and there are from eight to twelve heads on a stem, containing from sixteen to twenty rosy-purple flowers in each head. It is to be found in dry soils, usually on the slopes near lakes or streams, growing from a bulbous or corm-like root; these corms can be easily taken up in the autumn and transferred to some dry, sunny spot in the garden, where they will flourish with but little care.

LIATRIS SPICATA, WILLDENOW, is much like the one just described, growing taller, from two to five feet high; the heads more closely crowded on the long spike; and frequenting moist instead of dry soils. It has not been found by the writer, in the vicinity of Toronto. Mr. J. A. Morton mentions it among the attractive wild flowers growing in the vicinity of Wingham, and Macoun says it is found in marshy meadows from Sarnia to Point Edward.

The flowers of both varieties retain their rosy-purple color when dried, thus making an excellent winter bouquet. They can both be grown from seed as well as by transplanting the corms, and make, in a short time, an attractive feature of the flower garden. There is another Canadian species found in our prairie lands, the flower heads of which contain from thirty to forty flowers. It grows in dry soil, from two to five feet high, and according to Gray is to be found from New England westward to Minnesota, and southward. It is known as *Liatris scariosa*, Willdenow. The *rudbeckias* and *liatris* belong to the Composite family.

THE BUTTERFLY-FLOWER, *Asclepias tuberosa*, (Linn.), grows in any dry soil in the open sunshine; sometimes to be found in open woods, or among trees of small growth. The roots are thick and in young plants carrot-like in shape, but lose this form with

age, becoming more woody and extending to a considerable depth. They do not bear transplanting well, on which account it is better to raise them from the seed sown where the plants are to remain. The stalk is erect, clothed throughout with broadly linear leaves, and fine hairs; branching at the top, the branches terminating in a corymb of brilliant orange-red flowers, varying in intensity of color with the age of the flowers. The plant continues in bloom for a considerable while, and the cut flowers keep a long time in water, thus adding to the variety of such as are desirable for table bouquets; while the cut stems do not exude a viscid, milky juice so abundant in some of the other species of this genus.

The peculiar form of the individual flowers of all of the plants of this genus is a very interesting study, a careful examination of which is earnestly commended, noting particularly the hooded nectaries on the tube of stamens which encloses the pistil, and the attachment of the anthers to the stigma, with their hanging pairs of pear-shaped pollen-masses.

THE CARDINAL FLOWER, *Lobelia cardinalis*, (Linn.), is widely distributed throughout Ontario, frequenting low grounds, yet easily grown in any good garden soil, especially from seed. The flowers are very showy, deep red, borne on stems two to four feet high, in elongated, somewhat one-sided racemes. The flame color of these flowers renders them a very conspicuous garden ornament. The plants will thrive in partial shade, or in the open air, but do not endure well a protracted drouth.

THE GREAT LOBELIA, *Lobelia siphilitica*, (Linn.), is a blue flowered species, the flowers nearly an inch long, borne on a leafy stem varying from one to five feet high. This also is to be found in low grounds throughout Ontario. The writer has had no experience with it in cultivation, yet has no doubt but that it could be easily grown from seed in good garden soil, especially if not allowed to suffer from drouth.

THE HAREBELL, *Campanula rotundifolia*, (Linn.) This beautiful flower begins to appear in the last days of June, and continues with us all summer. The blossoms are bright blue, from half an inch to three quarters long; the plant seems to prefer partial shade, takes kindly to the garden, and makes a pretty appearance planted in masses. It is also indigenous to Europe.

“E'en the slight Harebell raised its head
Elastic from her airy tread.”

—Walter Scott.

ROSES.

BY WEBSTER BROS., HAMILTON, ONT.

Roses in the garden will in all probability be attacked by the thrip as soon as the foliage appears. Spraying with Paris green will be found an effectual remedy. A small quantity of soft soap, or even common soap, added, will make the remedy more effective. Care should be taken to burn all the wood pruned out of the roses, as that is where the thrip winters in the larvæ state, and as many of the roses are alive to the tips, or nearly so, this spring, a large number of the little pests will probably be found at work.

Examine all budded roses and remove all suckers that may have been overlooked last summer, this is of very great importance, as the suckers if allowed to remain, invariably destroy the rose bush. In pruning, the strong growing varieties should not be cut back as closely as those of a medium or weakly growth, for instance, if a strong vigorous bush of John Hopper were pruned as closely as Louis Van Houtte, the great probability is that John would produce elegant canes but little bloom. Some objections may be taken to this plan, but as a set-off, there is a certainty of great numbers of roses.

The old question of budded or own root roses, comes up fresh as ever every spring, and there is doubtless something to be said for and against either. Roses budded on the Manetti stalk will succeed in a greater variety of soils than roses on their own roots, and some roses such as La France, will attain a good size budded on a strong stalk, while on their own roots they have sometimes a struggle for existence for the first year or two. The only objection to the budded roses is that they are liable to throw up suckers from the stalk which if left to grow will injure the roses.

The "nice black mould from the woods," is the source of many a total failure among rose amateurs; it is doubtless desirable for some plants but roses will have none of it, a stiff clay suits them much better.

Reference was made to the comparative merits of Gloire de Dijon, and William Allen Richardson. The writer's experience has been, that while the old Gloire de Dijon is hardy enough to survive our winters with slight protection, and is a strong grower and an abundant bloomer, W. A. Richardson was, when grown under similar circumstances, a free grower, but an unusually shy bloomer; what few blooms were produced, were however very fine.

A very good plan for growing the strong-growing varieties, is to plant a number of them together and, instead of shortening back the canes, simply to thin out weak shoots, and to carefully bend down the canes, securing the tips to the ground by means of pegs or otherwise; this will cause the eyes along the entire length of the canes to send forth shoots and bloom, that would never have started had the cane remained perpendicular.

HEDGES.

BY CHARLES E. BROWN, YARMOUTH, N. S.

Surrounding our principal school grounds, several acres in extent, and enclosing a large number of our finest private residences, the hawthorn spruce and beech hedges of Yarmouth, excite the wonder and admiration of visitors. The common Scotch hawthorne is used, to which Burns refers in his "Cotter's Saturday Night."

"Beneath the milk white thorn that scents the evening gale,
Fond lovers in each other's arms breathes out the tender tale."

Three year old plants are imported, costing, delivered here, about eight dollars per thousand, the ground is properly prepared, drained, dug over and fertilized, the plants are set early in the spring, being among the first to grow, in double rows, ten or twelve inches apart, breaking joints. They are pruned two or three times a year to make a dense, bushy hedge, and allowed finally to attain a height of five or six feet, or in some cases, twelve or fourteen, that is proof against man or beast, dog, goose or small boy, and a perfect protection from the wind.

I can remember the first of these hedges, set out over *sixty years ago* and *still one of the best*. About thirty years ago, to improve its condition, it was cut back to the single stem, which was then hacked and slashed when it was desired new buds should break, and within a few years the whole hedge was in finer shape than ever.

A few specimens of this single white hawthorn have been allowed to grow, without pruning, to a height of about twenty feet, with a diameter of trunk of (12) twelve inches or more, and in some cases whole hedges have been neglected and permitted to grow to their full height. In June these are a mass of white bloom of most delightful perfume, filling the whole air with fragrance. The double white, single and double, rose and red hawthorn, are grown singly among our favorite ornamental trees, and are very beautiful during the brief period of bloom, but are destitute of fragrance.

Hedges of the native spruce from six to twenty feet high, are also grown to perfection; they bear pruning equally with the thorn, and in the winter season, in their comfortable dress of living green, opposing an impenetrable barrier to the fiercest winds, seem preferable to a deciduous hedge.

The Norway spruce fails here *utterly* everywhere ; in hedges the lower limbs die, and as individual specimens, the growth is shaggy and irregular ; out of the hundreds that have been planted, not a single fine specimen has ever been grown.

The Scotch beech has been planted in hedges and as a single ornamental tree, chiefly in our cemetery ; it bears pruning well, and its perfect hardiness, its thrifty, rare growth, and its fresh, pretty shade of foliage makes it a favorite.

No other hedge plant has succeeded out of the many that have been tried, on the recommendation of the ubiquitous tree agent. I recall the locust, the cedar, the buck-thorn, the privet, and the box, among the failures.

STRAWBERRY GROWING—THINGS WE HAVE OBSERVED.

BY JOHN LITTLE, GRANTON, ONT.

Every year we plant new varieties of the strawberry to test and compare with those of former season's planting. By this means we arrive at the value of those most worthy to keep for one's own use, and to sell to those who buy yearly from me those best commended.

This spring I ordered several varieties at \$2 per doz. and did not get them till near the beginning of June (after coming through the Custom House, which is as bad to many in Canada as the potato beetle and other noxious vermin). The plants were badly wilted, yet I did not like to lose them all, although it was so late in the season. I came to the conclusion I would cut the tops off some of the roots and put them in water, slightly warm ; they were cut just above the crown. They remained in the water till morning, and then I set them carefully in ground all ready prepared for them about six inches apart, so that if they lived I could cut them in squares, earth and roots together. To my astonishment not one plant died, but took hold of the soil at once, and one month from the time they were planted one could not tell the difference between them and those planted in April.

I have been so favorably impressed by this method that, if spared till next spring, I will cut the top from all strawberry plants we shall set. After being a close observer of growing plants for years, I have noticed that plants set early had a struggle for life, when three to five large leaves had to be supported. What benefit did the plants derive from these leaves ? Your answer will be, not any. If no benefit was derived, they were an injury. I think I can prove beyond a doubt that the large leaves upon young plants are injurious to them. Take a four-year-old tree, set with limbs not trimmed ; then take a similar tree and cut branches back within eight inches of stalk, and then notice for yourself which will start to grow the sooner. The greater amount of sap it requires to start a plant or tree, the longer it will be in starting.

Another point worthy of mention is that it is the crown you want to have start to grow, so that it may be able to keep its leaves above ground ; and it has a great disadvantage where the plant is struggling with these leaves, which feed upon the few fibrous roots that have taken hold. With the plant stripped of these leaves, there is nothing to support, and the plant takes hold of the soil at once, and in a day or so you will see the crown making its appearance ; and it would take some two or three weeks if it had the upper part of the plant feeding from it. Some think without you have a heavy top the plant is worthless, but, if you experiment in this line, you will become wiser.

Another point worthy of mention is *at what season should the plant be allowed to run* I answer not before July, and for fruiting beds I prefer August 1st to 15th ; and the plant at that date will produce more runners than the plants that were let run at July or earlier. If the runners are kept back the plants get a good start, and it has nothing to support but itself ; but if let run at an early period the runners will be feeble, and so will the plant the rest of the season. This season was proof of this with

me. Had I let the plants run at an early date they would not have made one third the plants they did. Those that started in September run along the ground, but at the first rain took root and made fine plants, as the vines were vigorous and had strength to push them.

Again, many overlook another important point and allow the blossoms to remain on the plant, thus exhausting its strength. The proof of this will be evident by noticing two plants side by side; let one bloom and produce fruit, and nip the bloom from the other, and see which one will make the finest plant or the first runner. These points are worthy of observation, and you will profit by testing them.

SELECTION OF VARIETIES.

There is no business more profitable than strawberry growing, provided the right method is followed. One of the chief secrets of success is to have not only a variety suited to your soil and climate, but the best varieties so suited. In no fruit grown is there as great and rapid improvements as in the development of the strawberry. If a man sticks to an old variety, either originally inferior, or running out, as all are prone to do, when he might be growing one twice or even three times as productive, the vines of which will, owing to superior size, firmness, beauty and general excellence, bring 50 per cent. more in any market, it is easy to see what disadvantage that man is laboring under. Yet, there are such men without number. They are fighting a brave but losing battle against progress. Keep in front, or, at least, keep in the front line, and grow the variety or varieties best suited to your soil. Do this or go out of the business, the quicker the better.

Most members of the Fruit Growers' Association are acquainted with the following varieties: Woolverton, Saunders, Williams, Bubach No. 5, Haverland, Hatfield; but of the newer varieties they may not be much acquainted, such as Marshall, Brandywine, Mary, Henry Ward Beecher, Aroma, Cyclone, Banquet, Noble, Princeton Chief, Tennessee Prolific, Timbrell, Annie Laurie, Splendid, Staples. The most of these will be offered for sale next spring. In productiveness, size, quality, they compare favorably with Woolverton, Bubach, Marshall and Timbrell.

COMMUNICATIONS.

REGRETS.

Letters of regret, because unable to attend, were received by the Secretary from the following gentlemen: Messrs. A. McD. Allan, Goderich; J. R. Howell, Brantford; J. D. Stewart, Russeldale; Dr. Aylesworth, Collingwood; E. B. Edwards, Peterborough; William Saunders, Director Central Experimental Farm, Ottawa; the Hon. John Dryden, Minister of Agriculture, and others.

WORLD'S FAIR MEDAL.

The following letter from John Boyd Thatcher, Chairman Executive Committee of Awards, World's Fair, was received by the Secretary. It refers to the medal and diploma conferred on the Ontario Fruit Growers' Association for the excellence of its publications on horticulture, viz.: Sixteen volumes of *The Canadian Horticulturist*, and the many valuable reports published during the term of years from 1862 to 1893, inclusive.

The letter reads:

WASHINGTON, D. C., March 24, 1894.

DEAR SIR,—I have this day forwarded to the Honorable Commissioner representing your country at the World's Columbian Exhibition an official copy of your award, which, in due time, will be inscribed in the diploma, and reach you through the proper channels.

Yours,

JOHN BOYD THATCHER,

Chairman Executive Committee on Awards.

SEEDS FROM RUSSIA.

In our Report for 1892 the members of our Association will remember that the Secretary gave a statement of the varieties of apple, pear and other fruit trees, scions and pits sent to his care by our friend Mr. Jaroslav Niemetz, of Winnitza, Podolie, Russia, who has become a regular member of our Association and a contributor to the pages of our journal.

Last spring he sent us a large collection of seeds, which the Secretary at once placed in charge of Mr. Saunders, Director of the Central Experimental Farm, Ottawa, where the best facilities are at hand for their germination.

The following letter from the Director gives an idea of the results. Time only will show whether any of the varieties will be of value to us in Canada :

OTTAWA, NOV. 14, 1894.

L. WOOLVERTON, ESQ.

DEAR MR. WOOLVERTON,—You wrote me some time ago in reference to the seeds forwarded from Mr. Niemetz, asking what success we had with them. I have looked up the particulars and submit you the following. You will observe that there was only one species in the lot (*Ribes Sibirica*), which was named, which detracts very much from their value.

The number of plants growing are as follows :

	No.		No.
10 Rose	34	12 Grape	23
6 Potentilla	35	2 Prunus	24
1 Spirea	36	13 Black Currant	30
90 Ribes Sibirica	7	3 No. 44, no name	
2 Ribes "	9	2 Rhamnus	11
15 Hop-tree	21	21 Rhamnus	12
85 Clematis	22	76 Rhamnus	13
1 No. 43, no name		14 Sambucus	45
3 Pyrus, variety of wild crab	45	45 Salvia	

24 No. 26, labelled gooseberry, does not look like gooseberry.

A large proportion of the seeds failed to germinate.

Yours, very sincerely,

WM. SAUNDERS.

SPECIAL FRUIT MARKET IN ENGLAND FOR CANADIAN APPLES.

A letter was also received by the secretary from S. J. Rutherford, St. Hilda, Gaspereaux Co., N. S., as follows :

ST. HILDA'S, GASPÉREAUX, N. S.

DEAR SIR,—I am having sent to you weekly edition of *Times* (London, England), just received, with a passage in it marked with reference to a circular note issued by the Premier of Tasmania to the heads of the other Australian Colonies with reference to an apple depot in London for the sale of Australian fruit. There is no doubt that this idea would be a great help to the fruit growers

Could not the subject be brought up for discussion at the annual meeting of the Fruit Growers' Association, to see if the Government could not be induced to join the Australian colonies in the scheme, should they determine to try it.

The fruit from Australia not arriving till about May, and their crop being over before the Canadian fruit arrives in September, would enable the building to be kept open for quite, if not nearly, all the year.

I remain yours truly,

S. J. RUTHERFORD.

Copy of extract from *London Times* :

TASMANIAN APPLES.

In a circular addressed by the Premier of Tasmania to the premiers of the other Australian colonies, suggesting the establishment of a joint depot in London for Australian produce, so as to obtain for the producers some of the profits now secured by middlemen, the following passage occurs : "So long as Tasmanian apples are put on the English market through what is practically a close corporation in Covent Garden, so long will the growers be limited in their market, receive less for their produce than they should, and be entirely in the hands of people whose sole object is to get through as much business as they can in one day, regardless of the condition of the market and the growers' net returns."

INSPECTION OF ORCHARDS.

The extremely practical interest which the Tasmanian Government takes in the subject of fruit growing is shown by the following extract from "Walch's Tasmanian Almanac" for 1894 : "By Act of Parliament 52 Vict. No. 16 the colony of Tasmania is divided into 30 'fruit districts' to make better provision for the destruction of the Codling moth (*Carpocapsa Pomonella*). In every district the fruit growers elect a board, consisting of seven members, from among such fruit growers; three and four members retire alternately in the month of September. The board appoints an inspector or inspectors for each district, who may at any reasonable time enter any orchard for the purpose of inspecting the trees. Occupiers of orchards are to furnish, on or before the 1st of December in every year, a return stating the number of acres planted with fruit trees on the 1st of September. If return is not made, the occupier is liable for a penalty not exceeding £5. A tax not exceeding 6s. per acre is to be paid annually by occupiers. Owner of unoccupied orchard to be deemed to be occupier. The Governor-in-Council may make regulations for the guidance of boards and their officers, and for prescribing the manner in which, and the times in which, the occupier shall bandage, dress or otherwise treat infected trees. Every person who sells or offers for sale any fruit infected with the moth is liable to a penalty of £5. The following regulations have been made under the Act : "Every occupier of an infected orchard to give notice in writing to an inspector or to the board of the existence of the moth in such orchard. The occupier of an infected orchard shall cause all trees in any orchard to be bandaged. Bandages to be placed upon the trunk of the trees not later than the first day of December in each year, and shall be removed and cleansed during the month of July following, and shall not be replaced upon the trees until the month of November then next. Occupiers shall remove all rough and scaly bark from trees during period between May 1 and August 1 in each year, and burn or otherwise effectually destroy such bark as soon as removed. All infected fruit growing on the trees to be at once gathered, and all infected fallen fruit to be forthwith picked up, and all such infected fruit shall be treated for the effectual destruction of the grub, either by immersion in boiling water or in such other way as the board may sanction."

APPENDIX II.

REPORTS OF AFFILIATED SOCIETIES.

THE BURLINGTON HORTICULTURAL ASSOCIATION, 1894

OFFICERS :

President : GEO. E. FISHER, Freeman P. O.

Vice-President : J. S. FREEMAN, Freeman P. O.

Secretary-Treasurer : A. W. PEART, Freeman P. O.

Assistant-Secretary : G. W. PEER, Freeman P. O.

Directors : Apples—O. T. SPRINGER ; Grapes—C. U. DYNES ; Small Fruits—W. V. HOPKINS ; Pears—W. F. W. FISHER ; Peaches—ALEX. RIACH ; Plums—J. S. FREEMAN ; Vegetables—W. J. BRIDGEMAN ; Shipping—JOSEPH LINDLEY.

Auditors : C. U. DYNES and EDWIN PEART.

Executive Committee : DR. HUSBAND, H. WILLIAMS, and ALEX. RIACH.

Entertainment Committee : The President, Vice-President, and Secretary.

We are pleased to be able to report another successful year for our Society.

There has been a substantial increase in the membership, which now numbers over seventy, our meetings have been well attended, and a keen interest is shown in all matters pertaining to fruit growing.

More and more the fact appears to be forced home, that, under the present economic conditions of farming, the line of growing fruit is one of the most profitable that this district can pursue.

Since our last report we have received official notice that the Burlington district scored three awards at the World's Fair, Chicago, on apples, pears and grapes, respectively, thus indicating our capabilities in the production of prime fruits. I might also add that there has been a large increase in the fruit acreage here during the past year or two. According to custom many members of the Association availed themselves of our annual outing. A pleasant and profitable day was spent among a few of the leading fruit growers in the Grimsby district. These outings are useful, entertaining and popular.

A Society exhibit of fruit was made at the Industrial Fair, Toronto, to which was awarded the first prize.

An effort is being made in this township (Nelson) to check the ravages of the black knot. Under the "Black Knot and Yellows Act" the council was petitioned to appoint at least one inspector to enforce the provisions of the Act. Two have been appointed, and they are now on their rounds. We believe that much good will result from it.

Papers and addresses were given before the Association during the year by the following gentlemen :

At the annual meeting in January, Messrs. Geo. E. Fisher, the President's annual address, on the fruit industry of 1893 ; Edwin Peart on "The Apple Crop" ; Alex. Riach, the "Small Fruits ;" A. W. Peart, on the "Grape Crop ;" W. F. W. Fisher, on "Pears and Peaches ;" J. S. Freeman, on "Plums ;" Harry Williams, on "Vegetables" and Joseph Lindley, on "Shipping."

At subsequent meetings, addresses were delivered by Messrs. O. T. Springer, on "Spraying ;" J. S. Freeman, on "Black Knot ;" W. V. Hopkins, on the "Strawberry Crop," and W. F. W. Fisher on "Currant and Gooseberry Culture."

These addresses were evolved from the experience, observation and information of successful fruit-growers, and consequently were valuable.

A. W. PEART,
Secretary.

BRANT HORTICULTURAL SOCIETY, 1895.

OFFICERS :

President : LYMAN CHAPIN, Brantford.

Vice-President : CHAS. GRANTHAM, Cainsville.

Secretary-Treasurer : D. M. LEE, Paris.

Directors : J. R. HOWELL, Brantford ; T. A. IVEY, Brantford ; CHAS. GRANTHAM, Cainsville ; DAVID GREIG, Cainsville ; DAVID WESTBROOK, Cainsville ; JAS. MILLER, Paris ; H. J. BRYAN, Mohawk ; G. R. COON, Norwich ; JOHN A. EDDY, Scotland.

A meeting was held at Burford, on Thursday, 22nd February, in the afternoon. The following programme was followed out :

Strawberry and Raspberry Culture, by G. R. Coon.

Rules and Prices for Pickers and Picking, by D. M. Lee.

Tomato Growing, by Alfred Ledger.

What are the Prospects of the Burford Canning Factory, by T. S. McIntee.

New Kinds of Fruits by David Greig.

Three Best Varieties of Strawberries for the County of Brant, by H. J. Bryan.

Pear Culture, by S. Hunter.

Canning of Fruit for Home Use, Mrs. (Dr.) Johnston.

The paper on Strawberry Culture, by G. R. Coon was as follows :

STRAWBERRY CULTURE.

I will give my mode of culture. I don't know if it will commend itself to others, but I have found it quite successful with me.

1st, I so arrange my strawberry plantation, that I either have a piece of ground summer-fallowed or ground that has been used for root crop. I manure in the fall late, just freezing up time, spreading it evenly over the ground. In the spring, harrow it the first thing, then plow not too deep and work down with the cultivator and harrow, finishing with roller. Then mark with a one-horse marker 3 ft. 10 in. one way and 2 ft. 8 in. the other. I use a six-tined fork to take up my plants with, not allowing the roots to dry in the sun or wind. Do not take up too many plants at a time. I use a spade made on purpose with a double blade standing one and a half inches apart at the top. The blade is only five inches wide, a foothold only on one side.

This is pressed in the ground about six inches and removed so as to leave a hole in the shape of a wedge. One boy follows and drops for two boys who set the plant in so as to leave the crown of the plant even with the top of the ground ; in this way it is not difficult to get the dirt firmly packed about the roots.

I never water plants. As soon as the first weeds break the ground we start the cultivator and work them both ways, always hoeing before they appear to need it.

If the season is favorable the cultivator should be stopped about the 20th of July, and only cultivate the way the rows are intended to run.

Then use the hoe, placing the runners each way from the parent plant placing a lump of dirt on the runner to keep the wind from blowing it out of place. Cultivate and hoe as late in the fall as the ground will admit. As soon as the ground freezes sufficient to bear up the horses and waggon, cover with clean straw, not too heavy, else you may smother the plants. This straw is removed in the spring as soon as the plants fairly start to raise the straw. The straw need not be removed if it is thin enough to admit of the plant growing through.

FRUIT CANNING FOR HOME USE.

The following selection is taken from the paper on this subject read by Mrs. JOHN STON :

A few suggestions can be given and which may, at least lead to discussion. A very good rule for canning small fruits and one that has met with great success is after making a syrup of the proper consistency to pack the fruit loosely in jars, pouring the syrup in afterwards. Have a vessel of cold water on the stove, place the jars in the water, allowing the fruit to boil about twenty minutes. Strawberries and raspberries canned in this way retain their flavor and color and remain whole. Plums, after being peeled are excellent put up in this manner. A good idea is to wrap two or three thicknesses of paper around the jars, as contact with the light affects the quality and color of the fruit.

An excellent rule for canning larger fruit such as peaches and pears is to place them in a steamer over a kettle of boiling water, laying first a cloth in the bottom of the steamer. After the fruit is steamed for about fifteen minutes drop each for a moment in the syrup, then place in cans, cover with the syrup and seal tightly.

GRIMSBY HORTICULTURAL SOCIETY.

The following are the officers of the Grimsby Horticultural Society organized 1895 :

President : J. H. Grout.

Vice-Pres.: C. W. Van Duser.

Sec.-Treas.: C. W. Van Duser.

Directors : Messrs. Wm. Forbes, A. G. Pettit, E. H. Read, James Doran, H. H. Anderson ; Mesdames—E. J. Palmer, R. J. Hewat, P. H. Gamble and A. G. Pettit.

Auditors : Geo. Alexander and Thos. Johnson.

C. W. VAN DUSER,
Secretary.

WOODSTOCK HORTICULTURAL SOCIETY.

The following officers have been duly appointed for 1895 :

President : T. H. Parker.

Vice-President : D. W. Karn.

Directors : G. R. Pattullo, R. B. Thornton, Geo. Blake, Angus Rose, Fred Mitchell, J. S. Scarff, and Malcolm Schell.

Auditors : J. G. Wallace and Mayor Cole.

At the closing of the general meeting a meeting of the directors was held and Mr. R. B. Thornton was appointed secretary, and Mr. J. S. Scarff, treasurer. It was also decided that all members of the Horticultural Society be made members of the Ontario Fruit Growers' Association.

R. B. THORNTON,
Secretary.

WATERLOO HORTICULTURAL SOCIETY.

SIR.—The following gentlemen have been elected officers of the new Horticultural Society formed here, in affiliation with the Fruit Growers' Association of Ontario :

President : James Lockie.

Vice-President : Charles Moogk.

Directors : Mrs. Philip Hohmeier, Mrs. H. J. Grasset, Mrs. George Wegenast ; Messrs. C. M. Taylor, J. H. Winkler, George Bolduc, William Henry, William Raymo and J. H. Roos.

Auditors : Messrs. John Killer and Byron E. Bechtel.

JAMES LOCKIE,
President.

THE NIAGARA FALLS SOUTH HORTICULTURAL SOCIETY.

SIR,—The following officers have been duly elected for the year 1895, and we have made all our members to be also members of the Fruit Growers' Association of Ontario. The date of organization was Jan. 25th, 1895 :

President : T. G. Cadham.

Vice-President : Dr. W. W. Thompson.

Directors : Rev. Canon Bull, Reeve H. G. A. Cook, Mrs. Land, Miss L. McNally, E. Morden, George Law, Thomas Berriman, R. Cameron, Edward Skilton.

Secretary : E. Morden.

Treasurer : William Doran.

The Society, which starts with about 70 members, is made up of the leading fruit growers in Stamford township and the leading families in the village of Niagara Falls.

E. MORDEN,
Secretary.

THE LINDSAY HORTICULTURAL SOCIETY.

SIR,—We have had during the past year 132 members in the Society, distributed 132 journals on fruits and flowers, some monthly and some semi-monthly ; held 6 meetings, public and directors'. There was some interesting discussions on fruits and flowers at our annual meeting held January 10th. The following officers were appointed for the year 1895 :

President : Mr. Joseph Cooper.

Vice-President : Mr. W. M. Robson.

Sec.-Treas : F. J. Frampton.

Directors : Messrs. Thos. Connolly, Thomas Beall, Robert Speir, Joseph Rickaby, J. H. Knight, W. H. King, Mrs. T. Beall and Mrs. H. McLaughlin.

Auditors : Mr. John Dobson and Mr. William Flavelle.

F. FRAMPTON,
Secretary,
Lindsay.

APPENDIX III.

CATALOGUE OF FRUITS FOR USE OF JUDGES AT EXHIBITIONS.

APPLES.

EXPLANATORY NOTE.—In the plan of rating, all varieties are supposed to be perfect specimens; then the best varieties under each of three or four heads are rated at ten, and all the more or less inferior varieties by some figure less than ten. It frequently happens, however, even with the best varieties, that imperfect samples are exhibited. In such cases all values given in the Catalogue must be reduced one or more points each, for (1) lack of color, (2) undersize, (3) unevenness of size on plate, (4) wormy, scabby or illshapen specimens, (5) lack of stem or calyx, (6) polished fruits, *i.e.*, having bloom wiped off, or for any other thing which tends to change the natural appearance of the fruit. To aid judges still farther in the intelligent discharge of their duties, score cards have been prepared by the Association, copies of which may be had from the Secretary.

The column "Total Value" is for use when prizes are offered for fruits without designating the purpose for which such fruits may be required.

Name.	Season.	Quality.		Commercial value.		Total value.
		Dessert.	Cooking.	Home market.	Foreign market.	
Alexander	A	.....	9	9	10	28
American Golden Russet	W	9	8	8	9	34
American Summer Pearmain	S	3	1	2	.....	6
Arnold's Beauty	W	5	2	2	3	12
American Pippin	W	5	3	3	5	21
Adam's Pearmain	W	8	8	7	7	30
Autumn Strawberry	A	5	1	2	5	13
Bailey Sweet	W	4	8	4	4	20
Baldwin	W	2	5	7	8	22
Beauty of Kent	A	6	6	8	7	27
Ben Davis	W	1	3	8	9	21
Benoni	S	10	8	4	7	29
Belmont	W	3	6	4	6	19
Blenheim Pippin	W	6	7	9	10	32
Blue Pearmain	W	6	6	8	8	28
Bottle Greening	W	6	7	2	4	19
Bourassa	W	5	4	3	6	18
Cabashea	W	2	7	8	9	26
Canada Baldwin	W	6	8	8	9	31
Canada Reinette	W	4	8	5	7	24
Cayuga Red Streak	A	2	8	7	8	25
Chenango Strawberry	A	8	3	7	.....	18
Colvert	A	3	9	7	8	27
Cornish Gilliflower	W	1	.....	1	2	4
Cox's Orange Pippin	A	9	3	7	10	29
Cranberry Pippin	W	7	8	8	8	31
Cellini	W	2	8	7	6	23
Domine	W	5	7	6	7	25
Drap d'Or	A	2	6	3	5	16
Detroit Black	A	.....	4	2	4	10
Duchess of Oldenburgh	S	6	10	10	10	36
Dyer	A	7	5	3	.....	.....
Early Harvest	S	9	3	9	.....	21
Early Joe	S	8	3	3	.....	14
Early Strawberry	S	8	2	7	.....	17
Edgar's Red Streak	W	5	7	7	8	27
Ella	W	2	4	3	5	14
Esopus Spitzenburg	W	9	7	9	10	35
Fallowater	W	7	8	8	9	32
Fall Jenetting	A	3	7	7	7	24
Fall Orange	A	4	7	6	3	20
Fall Pippin	A	6	8	7	7	28
Flushing Spitzenburg	W	6	6	6	7	25
Fameuse	A	10	5	10	8	33

NOTE.—In the first column the letter S denotes summer, A autumn and W winter.

CATALOGUE OF FRUITS.—APPLES.—*Continued.*

Name.	Season.	Quality.		Commercial value.		Total value.
		Dessert.	Cooking.	Home market.	Foreign market.	
Fall Queen (<i>See</i> Haas) .....	..				
Gloria Mundi	W		8	6	8	22
Golden Russet (English)	W	8	7	8	9	32
Golden Sweet	A	2	4	1		7
Grand Sultan	A	5	8	6	6	25
Gravenstein	A	9	9	10	10	38
Green Newton Pippin	W	9	4	6	8	27
Grimes' Golden	W	9	2	6	7	24
Haas (<i>See</i> Fall Queen)	A	5	7	7	6	25
Hawley	S	6	5	5		16
Hawthornden	A	2	8	7	7	24
Holland Pippin	A	6	8	7	7	28
Hubbardston Nonsuch	W	7	8	8	8	31
Hurlbut	W	8	8	8	8	24
Irish Peach	S					
Jeffries	A	7	6	6	7	26
Jersey Sweeting	A	1	3	1		5
Jonathan	W	9	7	7	8	31
Kentish Fillbasket	A		8	8	8	24
Keswick Codlin	A	1	9	6	7	23
King of Tompkins County	W	8	10	10	10	38
Lady	W	9		1	9	19
Late Strawberry	A	7	5	5	7	24
Lawyer	W	5	7	4	5	21
Lord Suffield	A	3	8	6	7	24
Lord Duncan	A	2	9	7	6	24
London Pippin	W		8			
Lowell	A	5	7	4		
Lord Burleigh	A	2	9	5		16
La Rue	W	4	9	8	8	29
Maiden's Blush	A	3	8	9	8	28
Mann	W	4	7	6	8	25
Magog Red Streak	W	3	7	5	7	22
McIntosh Red	W	10	7	7	8	32
Melon	W	8	8	7	8	31
Minister	A	4	6	6	5	21
Monmouth Pippin	W	6	8	6	7	27
Mother	A	8	7	6	6	27
Munson Sweet	A	1	3	2		6
Newton Spitzenburg	A	7	8	6	7	28
Northern Spy	W	8	10	10	10	38
Newton Pippin	W	9	9	7	10	35
Ontario	W	9	10	10	10	39
Peck's Pleasant	W	7	7	6	8	28
Pennock	W	5	7	7	8	27
Pewaukee	W	6	8	8	8	30
Peach	A					
Phoenix	W	4	7	7	8	26
Pomme Grise	W	9		5	7	21
Pomme Grise d'Or	W	10		6	8	24
Porter	A	5	4	5	3	17
Priestly	W	4	5	6	7	22
Primate	S	7	6	6		19
Prenzea	A	9	9	5	5	28
Princess Louise	W	10	7	8	8	33
Pumpkin Sweet	A		4	1		5
Pumpkin Russet	A	1	6	4	5	16
Pomme Royale (<i>See</i> Dyer)						
Rambo	A	5	1	2	5	13
Rawles Janet	W	4	5	3	5	17
Red Astrachan	S	5	7	8		20
Red Belle-fleur	A	2	4	2		8
Red Canada	W	6	6	7	8	27
Red Cathed	A	6	8	7	7	28
Red Russet	W	5	6	7	7	25
Red Bietzheimer	A					
Rhode Island Greening	W	8	10	8	8	34

CATALOGUE OF FRUITS.—APPLES.—*Continued.*

Name.	Season.	Quality.		Commercial value.		Total value.
		Dessert.	Cooking.	Home market.	Foreign market.	
Ribston Pippin	W	10	8	8	10	36
Roxbury Russet	W	6	8	8	9	31
Scarlet Pearmain	A	5	6	5	6	22
Shiawassee Beauty	A	7	6	6	.....	19
Smith's Cider	W	1	4	.....	1	6
Smokehouse	A	3	6	4	6	19
Sops of Wine	S	2	5	2	.....	9
St. Lawrence	A	7	8	8	5	28
Stump	A	5	6	5	.....	16
Summer Rose	S	6	6	4	.....	16
Swaar	W	7	2	1	4	14
Swaize Pomme Grise (<i>See Pomme Grise d'Or</i>) .....	.....	.....	.....	.....	.....	.....
Stark	W	2	2	7	8	19
Snow (<i>See Fameuse</i>) .....	.....	.....	.....	.....	.....	.....
Talman Sweet .....	.....	6	5	3	4	18
Tetofsky	W	7	9	6	.....	22
Trenton	S	10	5	9	9	33
Twenty Ounce (<i>See Cayuga Red Streak</i>)	A	.....	.....	.....	.....	.....
Vadevere	A	6	5	4	6	21
Wagener	W	8	7	6	7	28
Wallbridge (<i>See Edgar's Red Streak</i>) .....	.....	.....	.....	.....	.....	.....
Wealthy	W	8	6	9	9	32
Westfield-Seek-no-Further	W	7	7	7	8	29
White Astrachan	S	1	2	1	.....	4
William's Favorite	W	5	7	5	6	23
Wine Sap	W	7	.....	1	3	11
Wine	W	7	7	8	8	30
Yellow Belle-fleur	W	8	7	5	5	25
Yellow Transparent	S	6	7	6	.....	19

GRAPES.

(This list is subject to revision each year.)

Varieties.	Color.	Season.	Quality for table.	Shipping value.	Market value.	Total.
Agawam (Rog. 15)	R	L	8	10	9	27
Allen's Hybrid	W	M	5	2	4	11
Amber Queen	R	M	5	4	4	13
Amber	R	L	1	3	2	6
Aminia (Rog. 39)	B	M	8	10	6	24
Ann Arbor	W	E	3	2	3	8
August Giant	B	M	5	1	5	11
Augusta	B	M	6	.....	.....	.....
Barry (Rog. 43)	B	M	7	9	7	23
Brighton	R	E	9	6	8	23
Black Eagle	B	L	1	3	2	6
Black Pearl	B	L	1	3	2	6
Burnett	B	M	5	5	4	14
Canada	B	M	2	3	1	6
Catawba	R	L	9	8	9	27
Champion	B	E	2	5	5	12

LIST OF ABBREVIATIONS.—R red, W white, B black, L late, E early, and M medium.

CATALOGUE OF FRUITS.—GRAPES.—*Continued.*

Varieties.	Color.	Season.	Quality for table.	Shipping value.	Market value.	Total.
Clinton	B	L	.....	5	2	7
Concord	B	M	7	6	8	21
Cottage	B	E	5	5	4	14
Craveling	B	E	6	6	4	16
Croton	W	E	4	3	3	10
Cynthiana	B	L	1	2	1	4
Courtland	B	E	2	5	5	12
Delaware	R	E	10	7	9	26
Diana	R	L	6	8	7	21
Duchess	W	L	5	6	6	17
Dracut Amber	R	E	2	6	4	12
Eaton	B	M	7	5	3	15
Early Dawn	B	M	6	4	3	14
Elvira	W	L	1	2	1	4
Empire State	W	L	3	4	4	11
Early Ohio	B	E	3	6	5	14
Eumelan	B	E	6	5	5	16
Eldorado	W	M	7	5	2	14
Etta	W	L	2	4	3	9
Early Victor	B	E	5	4	3	12
Essex (Reg. 41)	B	L	3	7	6	16
Faith	W	E	2	2	3	7
Florence	B	E	2	2	3	7
Goethe (Reg. 1)	R	L	8	5	5	18
Gaertner (Reg. 14)	R	M	8	6	6	20
Hartford	B	E	3	5	6	14
Herbert (Reg. 14)	B	M	6	8	7	21
Highland	B	L	3	4	2	9
Hayes	W	M	5	2	3	10
Herbemont	B	L	1	2	3	6
Iona	R	L	8	7	6	21
Isabella	B	L	3	7	6	16
Ives	B	E	2	5	5	12
Israella	B	L	3	6	4	13
Janesville	B	E	2	3	3	8
Jessica	W	E	5	5	5	15
Jefferson	R	L	6	4	5	15
Jewell	B	M	4	4	2	10
Lady	W	E	8	3	8	19
Lady Washington	W	L	3	5	3	11
Lindley (Reg. 9)	R	E	10	9	9	28
Massasoit (Reg. 3)	R	E	6	4	7	17
Martha	W	M	6	5	3	14
Merrimac (Reg. 49)	B	L	7	9	6	22
Moore's Early	B	E	7	6	9	22
Moyer	R	E	7	7	9	23
Mills	B	M	6	7	3	16
Moore's Diamond	W	E	7	7	7	21
Marion	B	L	1	4	2	7
Niagara	W	M	8	5	9	22
Noah	W	L	1	5	3	9
Norton	B	L	1	5	2	8
Northern Muscadine	R	M	2	6	6	14
Oneida	R	M	3	2	4	9
Ontario	B	M	2	4	4	10
Othello (Arnold's No. 1)	B	L	2	3	2	7
Perkins	R	E	2	6	6	14
Pocklington	W	M	6	6	6	18
Prentiss	W	L	5	7	4	16
Poughkeepsie Red	W	E	6	6	7	19
Pearl	R	L	1	2	1	4
Rebecca	W	M	8	4	4	16
Requa (Reg. 28)	R	M	7	8	7	22
Rentz	B	M	1	2	2	25
Rockingham	B	M	7	6	8	21
Roger (No. 17)	B	M	6	6	6	18
Roger No. 32	R	L	3	7	6	16

CATALOGUE OF FRUITS.—GRAPES.—Continued.

Varieties.	Color.	Season.	Quality for table.	Shipping value.	Market value.	Total.
Roger No. 33	B	M	5	7	6	18
Roger No. 11	B	M	7	8	7	22
Salem (Roger 22)	R	M	8	8	8	24
Sanasqua	B	L	5	5	5	15
Secretary	B	M	3	4	3	10
Telegraph	B	M	3	5	3	11
Transparent	W	L	1	4	1	6
Triumph	W	L	1	5	1	7
Taylor	W	L	1	4	2	7
Ulster Prolific	R	M	4	5	5	14
Union Village (<i>See Ontario</i>)						
Vergennes	R	L	6	10	8	24
Victor (<i>See Early Victor</i>)						
Walter	R	M	6	7	7	20
Worden	B	E	9	4	8	21
White Ann Arbor	W	E	4	4	4	12
Wilder (Rog. 4)	B	M	8	9	8	25
Wyoming Red	R	E	5	6	7	18
Woodruff Red	R	M	4	6	5	15

PEARS.

	Dessert.	Home market.	Total.
Ananas d'Ete	4	6	10
Anjou	9	10	19
Bartlett	9	10	19
Belle Lucrative	7	6	13
Beurre Bosc	9	9	18
Beurre Giffard	8	9	17
Beurre Hardy	8	8	16
Beurre Gris d'Hiver	4	4	8
Beurre Superfine	6	5	11
Brandywine	7	8	15
Buffam	5	4	9
Clairgeau	5	9	14
Clapp's Favorite	7	8	15
Dana's Hovey	8	4	12
Dearborn	5	4	9
Dempsey	8	9	17
Diel	5	7	12
Doyenne Boussock	9	9	18
Doyenne d'Ete	5	4	9
Doyenne du Comice	8	7	15
Doyenne Grey	7	5	12
Doyenne White	8	7	15
Duchess d'Angouleme	7	8	15
Flemish Beauty	8	8	16
Frederick Clapp			
Glout Morceau	6	5	11
Goodale	8	8	16
Howell	8	9	17
Jones	6	4	10
Josephine de Malines	10	6	16
Kieffer	4	6	10
Kirtland	4	4	8
Lawrence	8	8	16
Louise Bonne	6	8	14
Manning's Elizabeth	7	5	12

CATALOGUE OF FRUITS.—PEARS.—*Continued.*

	Dessert.	Home market.	Total.
Mount Vernon	8	5	13
Osband's Summer	6	5	11
Petite Marguerite	5	4	9
Pres't. Drouard	7	8	15
Reeder	6	4	10
Seckel	10	5	15
Sheldon	10	9	19
Souvenir de Congres.....	4	6	10
Swan's Orange	5	7	12
Tyson	8	6	14
Triumphe de Vienne.....	8	8	16
Vicar	3	4	7
Winter Nelis	8	8	16

DISTRICT FRUIT LIST.—APPLES.

Showing the varieties considered most desirable for planting in the various Agricultural Districts in Ontario.

DISTRICT No. 1.—Stormont, Dundas, Glengarry, Prescott and Cornwall.

Summer.—Yellow Transparent, Duchess of Oldenburgh.

Autumn.—Alexander, Fameuse, Gideon, St. Lawrence.

Winter.—La Rue, Pewaukee, Golden Russet, Ben Davis, Talnan Sweet.

DISTRICT No. 2.—Lanark, Renfrew, City of Ottawa, Carleton and Russell.

Summer.—Yellow Transparent, Duchess of Oldenburgh.

Autumn.—Alexander, Montreal Peach, Wealthy and Haas.

Winter.—Pewaukee, Golden Russet, Scott's Winter, Talman Sweet and Edgar's Red Streak.

DISTRICT No. 3.—Frontenac, City of Kingston, Leeds, Grenville and Brockville.

Summer.—Yellow Transparent, Duchess of Oldenburgh and Red Astrachan.

Autumn.—Alexander, Wealthy and St. Lawrence.

Winter.—Golden Russet, Pewaukee, La Rue, Ben Davis and Red Canada.

DISTRICT No. 4.—Hastings, Prince Edward, Lennox and Addington.

Summer.—Yellow Transparent and Duchess of Oldenburgh.

Autumn.—Alexander, Trenton, Gravenstein and Wealthy.

Winter.—Ontario, Hubbardston's Nonsuch, Pewaukee, Ben Davis and Cranberry Pippin.

DISTRICT No. 5.—Durham, Northumberland, Peterborough, Victoria and Haliburton.

Summer.—Yellow Transparent and Duchess of Oldenburgh.

Autumn.—Alexander, Colvert, St. Lawrence and Gravenstein.

Winter.—Ontario, Hubbardston's Nonsuch, Pewaukee, Ben Davis and Blenheim Pippin.

DISTRICT No. 6.—York, Ontario, Peel, Cardwell and City of Toronto.

Summer.—Yellow Transparent and Duchess of Oldenburgh.

Autumn.—Alexander, Gravenstein, Red Beitigheimer and Wealthy.

Winter.—Golden Russet, Pewaukee, Ontario, Ben Davis and Hubbardston's Nonuch.

DISTRICT No. 7.—Wellington, Waterloo, Wentworth, Halton, Dufferin and City of Hamilton.

Summer.—Yellow Transparent, Red Astrachan and Duchess of Oldenburgh.

Autumn.—Gravenstein, Colvert and Wealthy.

Winter.—Golden Russet, Ontario, Blenheim Pippin, Baldwin and Cranberry Pippin.

DISTRICT No. 8.—Lincoln, Welland, Haldimand and Monck.

Summer.—Duchess of Oldenburgh and Red Astrachan.

Autumn.—Gravenstein, Ribston Pippin and Wealthy.

Winter.—Blenheim Pippin, Ontario, Princess Louise, Golden Russet and Cranberry Pippin.

DISTRICT No. 9.—Elgin, Essex, Oxford and Norfolk.

Summer.—Duchess of Oldenburgh and Red Astrachan.*Autumn.*—Gravenstein, Twenty Ounce and Fall Pippin.*Winter.*—Blenheim, Pippin, Ontario, Baldwin, R. I. Greening and Golden Russet.

DISTRICT No. 10.—Huron, Bruce and Grey.

Summer.—Yellow Transparent and Duchess of Oldenburgh.*Autumn.*—Gravenstein, Wealthy and Colvert.*Winter.*—Pewaukee, Ontario, Baldwin, Hubbardston's Nonsuch and Cranberry Pippin.

DISTRICT No. 11.—Middlesex, Perth and City of London.

Summer.—Duchess of Oldenburgh and Yellow Transparent.*Autumn.*—Gravenstein, Colvert, Alexander and Fall Pippin.*Winter.*—Golden Russet, Ribston Pippin, Ontario, Hubbardston's Nonsuch and Cranberry Pippin.

DISTRICT No. 12.—Essex, Kent and Lambton.

Summer.—Yellow Transparent and Duchess of Oldenburgh.*Autumn.*—Gravenstein, Chenango, Strawberry, Wealthy and Lowell.*Winter.*—Ontario, Blenheim Pippin, Baldwin, R. I. Greening and Golden Russet.

DISTRICT No. 13.—Algoma, Simcoe, Muskoka and Parry Sound.

Summer.—Duchess of Oldenburgh and Yellow Transparent.*Autumn.*—Alexander, Colvert, Red Beitigheimer and St. Lawrence.*Winter.*—Pewaukee, Golden Russet, Scott's Winter, La Rue and Wealthy.

DISTRICT FRUIT LIST.—GRAPES.

DISTRICT No. 1:

Black.—Champion, Worden, Early Victor, Moore's Early.*Red.*—Delaware, Lindley Moyer, Wyoming Red.*White.*—Eldorado, Niagara, Jessica, Vergennes.

DISTRICT No. 2:

Black.—Barry, Rog. 17, Herbert, Moore's Early, Worden.*Red.*—Delaware, Gaertner, Norwood, Vergennes, Lindley.*White.*—Duchess, Kensington, Moore's Diamond, Lady.

DISTRICT No. 3:

Black.—Champion, Moore's Early, Worden, Hartford.*Red.*—Lindley, Brighton, Delaware.*White.*—Moore's Diamond, Jessica, Eldorado.

DISTRICT No. 4:

Black.—Worden, Moore's Early, Early Victor.*Red.*—Wyoming Red, Delaware, Moyer.*White.*—Jessica, Moore's Diamond, Niagara.

DISTRICT No. 5:

Black.—Champion, Worden, Wilder.*Red.*—Brighton, Delaware, Salem, Lindley, Agawam.*White.*—Niagara.

DISTRICT No. 6:

Black.—Worden, Moore's Early, Champion.*Red.*—Brighton, Lindley, Delaware, Wyoming Red.*White.*—Jessica, Niagara.

DISTRICT No. 7:

Black.—Concord, Worden, Rog. 4—44, Moore's Early.*Red.*—Rog. 9—15, Vergennes, Delaware, Brighton.*White.*—Niagara, Moore's Diamond.

NORTH LAKE DISTRICT :

Black.—Champion, Worden, Rog. 4, Moore's Early.
Red.—Wyoming Red, Salem, Rog. 9, Delaware, Brighton.
White.—Jessica, Lady, Niagara.

DISTRICT No. 8 :

Black.—Concord, Worden, Rog. 44, Moore's Early.
Red.—Rog. 9—15, Vergennes, Delaware, Brighton.
White.—Niagara, Moore's Diamond, Pocklington.

DISTRICT No. 9 :

Black.—Worden, Concord, Rog. 4—44, Moore's Early.
Red.—Delaware, Lindley, Agawam, Brighton.
White.—Niagara, Pocklington.

DISTRICT No. 10 :

Black.—Concord, Moore's Early, Worden.
Red.—Brighton, Delaware, Lindley.
White.—Niagara, Lady.

LAKE SHORE DIVISION :

Black.—Concord, Worden, Moore's Early, Barry.
Red.—Agawam, Brighton, Lindley.
White.—Niagara, Lady.

DISTRICT No. 11 :

Black.—Concord, Worden, Rog. 19, Rog. 4.
Red.—Rog. 9—15, Brighton, Delaware.
White.—Niagara, Moore's Diamond, Jessica.

DISTRICT No. 12 :

Black.—Concord, Worden, Moore's Early, Hartford.
Red.—Delaware, Waiter, Rog. 15—22, Brighton.
White.—Niagara, Prentiss, Lady.

DISTRICT No. 13 :

Black.—Worden, Moore's Early, Champion.
Red.—Delaware, Lindley, Wyoming Red.
White.—Jessica, Moore's Diamond, Lady.

In compiling the foregoing grape lists we have consulted the directors, as well as the leading fruit growers throughout the several districts. We have also tried to frame the lists so as to advise the planting of such varieties as bear the highest general points for each district for hardiness, productiveness, etc., shipping quality of fruit, and commercial values.

Report of Committee.

APPENDIX IV.

NOTES ON VARIETIES OF FRUITS.

CONTRIBUTED BY MEMBERS OF THE FRUIT GROWERS' ASSOCIATION OF ONTARIO.

OUR OUT-DOOR GRAPES AND THEIR DEVELOPMENT FROM THE NATIVE SPECIES OF NORTH AMERICA.

BY W. MEAD FATTERSON, CLARENCEVILLE. QUE.

As far as limits will permit, it will be our purpose to take a retrospective course along the pathway of the development of the grape, from the period of the discovery of this continent to the present day. The first colonist of North America found wild grapes in profusion and distinguished the species as the Fox and Frost grape. As early as 1564 wine was made of them. An early writer on the subject tells us, the Rev. F. Higginson of the Massachusetts Colony wrote home in 1629, "Excellent vines are here up and down the woods, our Governor has already planted a vineyard with great hope of increase."

Grapes were found by the first settlers of Canada along the St. Lawrence as far north as the Isle of Orleans, and we conclude that they were in abundance from the fact of its being called by Jacques Cartier "Isle de Bacchus." Indeed from early accounts our ancestors showed equally as much enthusiasm over the grapes found indigenous to the country, as that evinced by us in this last half of our century over the descendants of the same given us by nature and art.

The late Prof. Asa Gray arranges the genus *vitis* of North America into four divisions, viz. : *Vitis Labrusca*, or Fox grape ; *Vitis cordifolia*, or Frost grape ; *Vitis vulpina*, muscadine, or southern Fox grape ; and *Vitis aestivalis*, or Summer grape. The great array of varieties now in cultivation are the result of either spontaneous or of artificial hybridizing.

Except in California and Mexico attempts on this continent to introduce the European species of grapes have ultimately proved failures. While one of our native species, from the resistant power of its roots to the *phylloxera*, has given the European vineyardist valuable stock for grafting upon, that have saved their vineyards from total destruction.

To the *Vitis labrusca* of Linnæus we owe the greater number of our present varieties. Its native home is east of the Alleghany Mountains, from South Carolina extending north to Canada. It adapts itself to varied soils and conditions, attaining the greatest size in the granitic soil of New England. From the class known as the northern *labrusca* our most valuable hybrids have been obtained.

The persistence of this type is so marked that where its existence as forming one of the parents of an hybrid has been in doubt, the question has been determined by planting the seeds and the reversion of some of the seedlings settled the point.

The first variety of this species that obtained wide celebrity was introduced by Mr. R. Prince of Flushing, Long Island, about 1820. He obtained it from Mrs. Isabella Gibbs, who discovered it growing wild in North Carolina in 1816 and brought it north.

Prince propagated it and called it the Isabella, and ten years later he published a treatise on the grape. It is cultivated now to a very limited extent, and is found too late for high latitudes.

The Isabella has played its part in rearing a numerous family of children, but they being of the southern type of the *labrusca*, but a few are in favor North.

One of them, the Adirondac, was introduced in 1852, though of surpassing excellence, did well for a few years in favorable localities, but from inherent defects was generally discarded, even in its native home on lake Champlain. The Catawba, a native of North Carolina, was brought to notice by Major John Adlum, of Georgetown, D.C., who published the first American work on grapes in 1825, under the quaint title of "A Memoir on the Cultivation of the Grape." In it he claimed that in introducing the Catawba he conferred a greater benefit upon the American nation than he would have done by paying off the national debt. In a very short time the Catawba was extensively cultivated along the Ohio river, and Nicholas Longworth, of Cincinnati, manufactured large quantities of wine of it. From disease overtaking the vine, the extensive vineyards of southern Ohio were destroyed, but in the lake region of central New York it found a more congenial home and is now flourishing, supplying our markets in winter with a grape having few equals as a long keeper. The Diana, a seedling of Catawba, was introduced to public notice in 1843 by Mrs. Diana Castore, of Boston, Mass., and was quite popular for a while; though not as productive as its parent, it is considered by some to be better and is still in favor south, but mainly for its keeping qualities.

In 1849, Ephraim W. Bull, of Concord, Mass., announced the discovery of the widely famous Concord. After it had captured public favor he was asked how he obtained it and his reply was "—I was looking about for the best grape which met the necessary conditions of hardiness, vigorous growth, size of berry, early ripening, and, with these conditions, as good flavor as the wild grape affords. At the foot of a hill on a woodland path leading to the river, there I found an accidental seedling in 1843. It was very full of fruit, handsome and sweet, and the whole crop had fallen to the ground before August was out. Here was my opportunity. I planted the grapes at once and got many vines, most of them harsh and wild, but one of them bore a single bunch which I found ripe on the 10th September, 1849, six years from sowing the seed. This was the Concord."

Mr. Bull continued his efforts, and succeeded in establishing a strain of seedlings giving new grapes to the country every year. Its progeny could be numbered by the hundred, but for our present purpose only those tested here will be given, namely: varieties the result of natural variation or other parent uncertain, Moore's Early, Worden, Lady, Martha, Eva, Pocklington, Norwood, Cottage, Eaton, Rockland Favorite, and the numerous Concord seedlings of the late T. B. Miner, of New Jersey.

Varieties definitely known to be crossed with Delaware are, Duchess, Nectar, and most of the late John Burr's seedlings. With Iona are Jefferson and Highland. Allen's hybrid crosses are El Dorado and Lady Washington. Niagara is claimed to be crossed with Cassidy. Woodruff's Red by Catawba, Brighton by Diana, Hamburg.

The foreign crosses are also numerous but successful only in the south.

In 1850 Hartford Prolific was introduced by Steele of Hartford, Conn., meeting with favor, being the earliest variety then known, but the effect of dropping its berry when ripe detracted from its value as a market grape. It is still in favor north. The most prominent *labruscas* enumerated as being discovered in the first half of this century were natural seedlings, or, as called by some, "Spontaneous Hybrids." Now we shall enter the era of artificial hybridization. By this process the first successful products were given to the world in 1856 by Edward S. Rogers, at Salem, Mass. The direction of his efforts were in impregnating the Mammoth *labrusca* of New England with varieties of the species *Vitis vinifera* of Europe. As a result he retained and designated, by number, over fifty new varieties. In time several of these became the leading grapes of commerce, viz: Massasoit, Lindley, Herbert, Barry, Aminia, and Salem, the special merits of which may perpetuate his name in connection therewith for many generations. The success attending Rogers' efforts gave a surprising impetus to attempts in this direction by others. Unfortunately for Rogers his zeal was not proportionate to his means, and

his valuable hybrids, which in our time would have assured him a fortune, left him comparatively a poor man.

Dr. Stephen W. Underhill, of Croton Point, on the Hudson, an enthusiast in this field, at an early day brought out several varieties by *labrusca* crossings. Those tested in Canada were Irving, Senasqua, and Black Eagle, and a Delaware cross called Croton. Further south these have stood the test of time.

The late Peter C. Dempsey, of Trenton, Ont., followed the same path, and produced Burnet, by Black Hamburg crossing. J. H. Ricketts, and the late A. J. Caywood, both on the Hudson, originated varieties of value by crossing with the *labrusca*. Rickett's crossings, mostly on the *riparia* species, now number several hundred, though comparatively few have attained prominence. The popular varieties, Delaware, Creveling, Taylor, as well as some of Rommel's productions, are claimed by some authorities as partaking of *labrusca* blood.

To conclude, this type of grapes, Cottage, Telegraph, Belvidere, Woodruff Red, Jessica, Wyoming Red, and Champion, have in recent years given us varieties prominent for early ripening, especially the Champion, which is much valued north, and still holds the palm as an extra early and profitable grape. These latter are spontaneous productions or variations of the original type by which nature, in her origin of species, has been so bountiful to mankind in the present century.

We will now have to consider briefly the *Vitis cordifolia* of our native species, known as the Frost grape, or rather its subdivision named by Michaux, *Vitis riparia*. This species is not only distributed well to the north, along the banks and islands of our Canadian rivers, but its geographical boundaries extend south and west over a great part of this continent. Nature, in this species, has supplied us with wine as well as an edible grape, readily propagated by cuttings. Dr. Despetis, in his study of the *riparia*, has noted over 300 sub-varieties, of which the Clinton is the most prominent. The Taylor, as before noted, thought to be an accidental cross with *labrusca*, has given the south valuable wine grapes in Elvira, Noah, Missouri Reisling, Grein's Golden, and Rommel's Hybrids, viz: Amber, Pearl, Transparent, Faith, July, and others. While Ricketts of Newburg, N. Y., with Clinton, produced Bacchus, Empire State, Naomi, Peabody, Pizarro, Quassaick, Secretary, and Waverly, six of these have been tested in Clarenceville and all but Bacchus discarded. Three of these flourished for a few years and then gradually dwindled out. Peabody and Waverly were exquisite in quality. Perhaps if their foliage had been sprayed by mixtures now in use other results might have been obtained. The Clinton, crosses of Arnold of Paris, Ont., have fared the same here. If some of the finest children of the *riparia* species are to be saved we must interpose with spraying mixtures.

In conclusion a brief tribute is due to prominent propagators, whom with those already named, have contributed valuable varieties to our northern grape list. The Hon. Geo. W. Campbell, of Ohio, in introduction of "Lady" has given us the most valuable extra early white variety, and will soon introduce an extra early black, to be known as "Campbell's Early." Few men have taken more interest in popularizing grape culture.

Samuel Miller, of Missouri, discoverer of Martha, still a popular white, can look back over a useful life's work in this and other branches of fruit culture. John B. Moore, of Concord, Mass., will be remembered in connection with Moore's Early: Jacob Moore, of Brighton, N. J., with Brighton and Moore's Diamond: Jacob Rommel, of Missouri, with Rommel's Early Black. These names, with those of Bull, Rogers, Caywood, Burr, Ricketts, Dempsey, Prince, and Underhill, veterans who have mostly passed away, will survive in connection with their creations for many generations.

THE FALL AND THE WINTER BLENHEIM ORANGE.

BY E. B. EDWARDS, PETERBORO'.

I think I am beginning to understand the conflicting statements as to the Blenheim orange being called by some people a fall apple, while I called it a winter apple. Following the dry August, the whole of the apples on four or five Blenheim orange trees

began to fall early in September, and the "equinoctial" of the 22nd of September stripped the trees. The fruit was large, fully ripe and colored, and showed that it would not keep at all. At the same time eight or ten other trees alongside held their fruit firmly through all the winds, and the apples on them were clearly immature, not fully grown, not colored, and hard and firm. I sent specimens to Mr. Craig. He pronounced those that had fallen to be the typical Blenheim—the others a later variety of the same. He adds, "In this instance the variation is worth perpetuating." I quite agree with him, for the later ones will keep till the end of winter, or even into May, while the early ones will hardly keep till Christmas. The difference between the two classes of trees has been noticed before, but it has never been so noticeable as this year, when the dry season ripened the earlier variety before its time, while the September rains apparently checked the ripening process in the later variety.

THE HARDINESS OF THE CANADA RED (RED CANADA).

By R. W. SHEPHERD, JR., MONTREAL, QUE.

In a paper read by me before the Farmers' Congress, at the City of Quebec, in January, 1893, and which was afterwards published in the last June number of the *Horticulturist*, I mentioned Canada Red as having proved to be a very hardy tree, after upwards of three years of trial at Hudson-on-the-Ottawa. It is extraordinary that the fact of the hardiness of this variety does not seem to have been brought prominently before the notice of fruit growers heretofore. The test of the hardiness of Canada Red, to my mind, is conclusive. The orchard at Mount Victoria, Hudson, Ont., is situated within two miles of my own at Como, and I have had ample opportunity to observe the present condition of the trees of that orchard, and to know of the dreadfully neglectful way in which these trees have been cared for, ever since the death of the late Mr. George Matthews (some twenty years ago), who planted out the orchard. The farm was sold shortly after Mr. Matthews' death to a Montreal gentleman who never, I understand, visited the place, and the several tenants who have rented it, from year to year, of course never took the slightest trouble to cultivate the orchard properly, or even to prune the trees. The soil of that orchard is the poorest quality of sand, so poor that the present tenant has told me he sometimes fails to get even a crop of oats off it in dry seasons. Under such conditions it is surprising that any of the trees planted by Mr. Matthews, nearly thirty-five years ago, are alive at all. Some of the trees were obtained from Montreal, such as the Fameuse, St. Lawrence, Pomme Grise and Bourassa, and of these only a few survive. I distinctly remember Mr. Matthews saying that he bought a number of his trees at Rochester, N.Y. Among these, I think only Canada Red and some Talman Sweet survive. But the best trees by far, the healthiest and most productive, are the last named. The present tenant says he has frequently taken six barrels per tree, of good marketable apples, off them, and obtained some years four dollars per barrel. For many years the several tenants of Mount Victoria sold the Canada Red under the name of Red Spitz. I never took particular notice of this apple until four years ago, when I was struck by the fine, clean, healthy appearance of the fruit. Knowing that Red Spitz could not be the correct name, and at the same time being aware that many of the trees of this orchard were brought from the state of New York, I sent specimens to several pomologists, among others to Mr. L. Woolverton, of Grimsby, and all pronounced the variety Canada Red.

Fine specimens were sent from this province to the World's Fair in the fall of 1892, and placed in cold storage there, with other Quebec apples, and were exhibited until the disastrous fire in the cold storage building destroyed all the fruit, of 1892, in July last. No specimens of Canada Red were sent to the fair from this province in 1893.

In this connection it is interesting to quote a letter recently received from J. C. Plumb, of Milton, Wisconsin, an authority in that state on fruit. He says: "Mr. Hoxie (who was in charge of the Wisconsin fruit), brought from the World's Fair several specimens from the Canada fruit, one labelled 'Red Canada,' which is our Baltimore—

See Downing, pages 86 and 322. The tree Red Canada is much less hardy and vigorous, but bears double the fruit here, and in quality far better than the Baltimore. If the Baltimore bears well with you it is valuable. Its fruit is larger, cavity smaller, stems shorter, calyx closed, basin much more shallow than Red Canada. It bears almost entirely at the extremity of last year's shoots, which are thus enlarged at that point, making quite a bunch, where last year's fruit was borne."

I wrote Mr. Plumb and stated that the specimens taken to Wisconsin in the fall of 1893, by Mr. Hoxie, could not have come from the Province of Quebec, but probably from Ontario—and, furthermore, I am of the opinion that Downing's description of Red Canada more correctly corresponds with the fruit as grown at Hudson than that of Baltimore.

Downing, however, says "Red Canada is not now much planted on account of its small size and poor fruit." This has not been the experience of those who have grown that variety here. Under the most careless cultivation, and the disadvantageous conditions above mentioned, the fruit is, at least, *medium* in size and often above medium. It will be interesting to hear something from growers in Ontario who have had experience with both Red Canada and Baltimore.

THE SARAH RASPBERRY.

By JOHN CRAIG, HORTICULTURIST, C. E. F., OTTAWA.

SARAH. Produced in London, Ont., by Prof. Saunders, from seed of Shaffer's Colossal. Plant a moderate grower, suckering freely, and propagating naturally only in this way. The foliage seems to be intermediate between the European raspberry *Rubus idaeus* and the American *Rubus strigosus*. The canes have been affected to some extent by anthracnose, but not more than Cuthbert or Marlboro' growing alongside. Fruit large, round; drupes large, deep garnet, firm, very juicy, pleasantly acid and exceptionally rich. A few ripe berries were found last year, and this year, at the time of the first picking of Cuthbert, but the main crop did not ripen till the season of Cuthbert was over, the last picking taking place each year from the 8th to 12th August.

A striking characteristic of this variety is its habit of ripening the fruit in consecutive order and much regularity, beginning with the terminal clusters of each branch. Of course this is in a measure true of all red raspberries, but none that I know of carry the peculiarity to the same extent.

NOTES ON VARIETIES BY THE SECRETARY.

APPLES.

The Talman Sweet. The Talman Sweet has great value as food for stock; the food is easier grown than carrots, and excels them as food for our horses. In the home it is highly prized by many people as a dessert apple, and those who are fond of bread and milk will find it a delicious addition to that wholesome article of diet, if first well baked in the oven. In the eastern states the Talman Sweet is considerably grown for market, because in such cities as Boston there is a special demand for this fruit. In Canada there is little use in growing it for market, because there is no demand for sweet apples in either the English or the Canadian markets.

The Talman Sweet is a native of Rhode Island. The tree is a vigorous grower, with an upright spreading top.

The fruit is thus described by Mr. Charles Downing: Form, nearly globular. When fully ripe, whitish yellow, with a soft blush on one side, and generally a line running from stem to calyx. Stalk rather long and slender, inclining to one side, and inserted in

a rather wide, shallow, but regular cavity. Calyx set in a small basin, slightly depressed. Flesh quite white, rather firm, fine-grained, with a rich, sweet flavor. November to April.

As a stock on which to top graft other varieties, the Talman Sweet cannot be excelled. It is very hardy, of healthy and vigorous growth, very productive and seems to impart to the variety top grafted upon it, some of its excellent qualities. The King is usually a poor bearer, but when grafted on the Talman Sweet stock, it not only produces fruit of better quality, but it is quite productive. We are so convinced of its excellence in this regard, that, if planting a new orchard to-day, we would be inclined to plant all Talman, and later on to top-graft them with the required varieties.

Here is an article by the late Mr. Nicol, of Cataraqui, for many years one of the directors of the Ontario Fruit Growers' Association, on this very subject, which is sufficiently opportune to be inserted here.

Many of the choicest varieties of apples, such as the Northern Spy, Ribston Pippin, R. I. Greening, Gravenstein, Baldwin and King of Tomkins County, which are somewhat tender, can be grown successfully by root-grafting or by budding on common stock only in favored localities; yet by top grafting on hardy stock they can be satisfactorily grown where only hardy varieties succeed in the ordinary way.

The Talman Sweet is peculiarly adapted for this purpose. Next to the Crabs and the Duchess of Oldenburg, it is the hardiest of all known varieties. Indeed, I have found it to be quite equal to the Duchess in this respect. I have known trees of it so mutilated by cattle and horses as to be considered completely destroyed, yet, when given a fair chance, recovered and became remarkably healthy and good bearing trees. In fact, there is no kind of apple tree that will stand as much hard usage and survive. It is less particular as to soil and situation than any other kind of apple tree. It endures dry seasons better than most sorts. Its bark being of a thick, tough, leathery nature, soon overgrows almost any wound; and good, sound grafts inserted into its branches seldom fail to grow. Its growth is very much of the same habit as that of the Duchess, throwing out its branches at nearly right angles with the trunk; unlike the Spy, which forms forked crotches that readily split when the tree comes to mature age. I have never known a Talman Sweet tree split at the crotches by weight of fruit, by accumulations of ice or by wind storms. In short, it is the most enduring kind of apple tree that I know of.

It should be observed that in top-grafting any kind of apple tree, the whole top should not be cut off at once, because the too severe check is apt to kill the tree. A far better way is to make a two or three years' process of it; the first and second year grafting only each alternate side branch, and, finally, the third year grafting the top branches.

Branches into which grafts are to be inserted should not be cut off too close to the trunk, where they are of large size, but rather where they are subdivided into branches about 1 or $1\frac{1}{4}$ inches thick; then the joint quickly heals over; whereas, when grafts are inserted into the side of a large stump they are much more readily broken off.

There are now growing throughout the country a great many Talman Sweet trees—perhaps more than of any other variety of apple. I know of many instances where orchards were planted years ago, and now all that remains of them is the few Talman Sweet trees which constituted part of the selection.

The Talman is by common consent adjudged to be the best baking apple; yet it is hardly salable in any market in Canada; therefore, it is of little value beyond what is required for family use, and for that purpose one or two trees in an orchard is sufficient. If all the others were top-grafted with choice sorts there might be much more good fruit grown.

The Ben Davis. Perhaps there is no apple about which more difference of opinion exists than the Ben Davis. Like the Kieffer pear, the Crescent strawberry, the Lombard plum, and the Concord grape, we might say of the Ben Davis that, while far from being the first of its class in quality, it stands at the head for productiveness and consequent profit. The early orchardists in Ontario planted their commercial orchards with the Baldwin but

now find that in many localities instead of being the most productive, it is the least so; orchardists in the western states, on the other hand, have planted the Ben Davis in their commercial orchards, and in fruitfulness at least it has not disappointed them.

In southern Ontario many of the best orchards of Baldwin have been almost barren for the last half decade of years, and it is for this reason we bring under the notice of the owners an apple which is not a failure in this respect at least. The late P. O. Dempsey, who was our director for Prince Edward county, had great confidence in the Ben Davis, and in our report for 1893, page 7, he says; "I can make more money out of one tree of the Ben Davis than I can off fifty Kings. We have a lot of trees of the latter variety twelve years planted, and have never realized twelve barrels off them, but we have taken that many off a single tree of the Ben Davis. For market value, we find that in England the Ben Davis has sold as high as 32s. a barrel.

At our meeting in Peterborough last December, Mr. Alex. McNeill championed the Ben Davis. He said, "The Ben Davis is like a piece of cork in the fall or winter, but in the months of January, February and March, a well-grown Ben Davis is just as nice an apple as I want to eat, and I am very particular in my choice of an apple, too. As for profit, I believe there is no apple grown that will give you as much." Mr. Stenson, of Peterborough, said, "I planted seventeen trees of the Ben Davis sixteen years ago. They began bearing in six years, and have been bearing ever since. This last year I took eighty-six bushels off those trees—eighty of them good salable apples. I would sooner grow the Ben Davis at 50 cents a bushel than any other apple at \$1." Mr. Stenson's method of handling them is to store them until the 20th of May, when he ships them to England, and gets the top price in the market.

On the other hand, it is urged by some apple growers, whose experience is equally reliable, that when planting an orchard we should choose varieties of better quality than the Ben Davis, because the time will come when quality must rule in the markets. At our meeting in Windsor, Mr. Elliot spoke as follows concerning this apple: "No doubt the Ben Davis sells well, but I think a man who charges his neighbor \$2 for a barrel of Ben Davis robs him of \$1.75. It may do very well for hotel-keepers, for one barrel of them will last a first-class hotel as a dessert apple about three months, whereas a really good apple will not last a week. If you send a boy into the cellar for an eating apple, he never brings a Ben Davis, and if your wife wants to please you with an apple dumpling, she does not choose the Ben Davis."

Mr. A. McD. Allan said at the same meeting, "Although good prices are now paid in England for the Ben Davis, it is bound to come down in value before very long. The fact is they are looking into the quality of apples in those markets more closely than the consumers in our own markets."

The estimation in which this apple was held by our fruit committee is shown by the rating they gave it, viz., dessert, 0, cooking, 1, home market, 8, foreign market, 9;—only 18 points out of a maximum of 40.

At Chicago the Ben Davis was one of the finest looking apples shown by Idaho, Oregon and British Columbia. As grown in those quarters, the apple is twice the size of those grown in Ontario, and more highly colored; while the Spy, one of our best quality apples, is a miserable failure. No wonder the Ben Davis is the great apple of the west.

We cannot better describe this variety than by quoting from A. J. Downing's great work. He says, "The origin of this apple is unknown. J. S. Downer, of Kentucky, writes that old trees are there found from which suckers are taken in way of propagating. The tree is very hardy, a free grower, with very dark reddish brown, slightly grayish young wood, forming an erect, round head, bearing early and abundantly. In quality it is not first rate, but from its early productiveness, habit of blooming late in spring after late frosts, good size, fair, even fruit, keeping and carrying well, it is very popular in all the southwest and west.

Fruit, medium to large. Form, roundish, truncated conical, often sides unequal. Color, yellowish, almost overspread, splashed and striped with two shades of red, and

dotted sparsely with areole dots. Stalk, medium, rather slender. Cavity, narrow, deep russetted. Calyx, partially open. Basin, wide, abrupt, slightly corrugated. Flesh, white, tender, moderately juicy, pleasant subacid. Core, medium to large. Good to very good. December to March.

PEARS.

The Howell. Of the pears grown for market at Maplehurst, one of the most satisfactory of its season is the Howell. Its size, freedom from scab, worm holes and other blemishes, and clear, yellow skin at maturity, combine to make it a very attractive pear for market. It ripens about the end of September, just when the Bartlett season is over. We do not know of any other variety more desirable at this season, unless we except the Duchess which is often very inferior in appearance owing to curculio knots. The Sheldon, of course, surpasses them all for dessert purposes, but the tree is not nearly so productive and the fruit is not more attractive in appearance. In the estimation of fruit growers generally, the Howell is one of the best of the varieties of American pears.

The tree is an upright, vigorous grower and very productive.

The pear is thus described by Downing: Fruit rather large, roundish, pyriform; light, waxen color, often with a finely shaded cheek, thickly sprinkled with minute russet dots and some russet patches; stalk medium length, inserted without cavity, sometimes by a ring or lip sometimes in a small cavity; calyx open; segments recurved; basin rather large and uneven; flesh whitish, juicy, melting, brisk, vinous. Quality very good; season, September, October.

It originated with Thomas Howell, of New Haven, Conn.

The Dempsey. On the occasion of our visit to the Trenton Apple and Pear Experiment Station, Mr. W. H. Dempsey pointed out to Prof. Hutt the original tree of the Dempsey pear. It was of good size and thrifty growth, but had been annually robbed of its young wood for propagating purposes. It was about 20 feet high and the trunk 6 or 7 inches in diameter. We brought with us a fine sample, which by measurement was 4 inches in length and $3\frac{1}{2}$ in thickness at its widest part. The pear, at the time of writing, is firm and good for keeping some time yet, thus covering a season in the market, when the Bartlett is entirely cleaned out, unless kept in cold storage. It so much resembles Bartlett that it could be well sold for that pear, but its flesh is essentially different, though scarcely inferior.

The pear is the product of many experiments in hybridizing conducted by the late P. C. Dempsey, father of the present experimenter, and we are glad that so good a fruit bears his name. The tree was grown from a seed of the Bartlett and fertilized with the Duchess d'Angouleme. It is an upright, good grower; foliage large, glossy, dark green, resembling both parents.

The Anjou. The late M. P. Wilder, who was for so many years at the head of the American Pomological Society as its revered President, has the honor of introducing to American fruit growers this excellent early winter pear, the *Beurre d'Anjou*.

Its name would seem to imply that it is of French origin, but it is said to have first originated in Belgium, whence it was brought into France, and it soon became one of the most popular varieties in that country.

This pear was also the favorite of the late Patrick Barry, former President of the Western New York Horticultural Society. In January, 1888, he exhibited the most magnificent specimens of Anjou pears that we ever saw, at a meeting of that society held in Rochester on the 26th of January. They were quite large and yellow. He had kept them in a cool room, and they were in prime condition for eating, though a month after their usual season. "As an early winter pear the Anjou is unequalled," were the words of this veteran pomologist at that time. Had the Anjou a red cheek like that of the Clairgeau, it would be generally accepted as a perfect market pear, but its dull color, at least until it yellows up, is somewhat against it in the market.

The late E. Moody, of Lockport, N.Y., remarked, at the same meeting, that with him the Anjou had suffered considerably from the blight, but that otherwise he considered it a magnificent variety, and worthy of being planted much more extensively than it is at present. Others stated that they had not found it to be any more subject to blight than other varieties, and with this the experience of the writer agrees.

"The Anjou is one of the most profitable pears for the orchard," was the testimony of the late A. J. Downing, "bearing abundantly and evenly, whether grafted upon the pear or upon the quince stock." With regard to the profits of growing this or any other kind of pears, however, times have wonderfully changed during the last twenty years. In the year 1869, Mr. P. T. Quinn published a book on pear culture, the reading of which filled the writer with dreams never to be realized. He stated in that book that pears would bring an average of some \$20 or \$30 per barrel, and that they were, by all odds, the most profitable of all fruits.

Certainly, at such prices, they would be, but the cold reality is a little different nowadays, when we find the average is scarcely \$3 per barrel, for our finest varieties.

In this connection it will be of interest to include Charles Downing's description of the Anjou pear: Fruit, large, obtuse pyriform; stem, short, thick and fleshy, inserted in a cavity, surrounded by russet; calyx, very small, open, stiff, in an exceedingly small basin, surrounded by russet; skin, greenish, sprinkled with russet, sometimes shaded with dull crimson, and sprinkled thickly with brown and crimson dots; flesh, whitish, not very fine, melting, juicy, with a brisk, vinous flavor, pleasantly perfumed; very good to best. October, November.

GRAPES.

Moore's Early. One of the best black grapes for northern sections is the Moore's Early. Both the wood and the fruit ripens early, two all-important characteristics; while the quality is pretty good, superior to its competitor in early ripening, the Champion, if not quite as productive. It is hardier than Concord, which variety it precedes from two to three weeks in time of ripening, and by some is thought to excel it also in quantity.

The bunch is medium, shouldered, compact; the berry, large, round, black, with a heavy blue bloom, and the vine is hardy and moderately productive. After the fruit is ripe the berries are included to drop, and when gathered it soon deteriorates in quality.

The Moore's Early grape was raised by Mr. J. B. Moore, Concord, Mass., and was first exhibited before the Horticultural Society of that State, in the year 1872, gaining the first prize for the best early grape.

Mr. R. B. Whyte, of Ottawa, says that with him the Moore's Early ripens from the last of August to the middle of September; and he would place it first among the black grapes suitable for the Ottawa Valley.

Mr. Robson, of Lindsay, considers it one of the best black grapes for his section, on account of its quality and its earliness.

Mr. John Craig, Horticulturist, Experimental Farm, Ottawa, writes: The Moore's Early ripened in 1890 at Ottawa on Sept. 6th—five days after Champion. Last year all varieties in this vicinity were a week to ten days later in ripening than usual. Moore's Early matures Sept. 14th—seven days after Champion. Its good points are its early ripening habits, hardiness and freedom from mildew. Among its weak points may be noted, slowness of growth, and, on some soils, lack of vigor, light bearing habits and perishable character of fruit. As an amateur variety in northern localities and for near market, Moore's Early has much value. As a commercial variety in grape-growing sections, I should not care to advocate the planting of this in a large way for profit.

Mr. D. Nicol, Catarqui, says: What I have seen of Moore's Early grape, I believe it is well suited for this district. It ripens earlier than the Worden, and the fruit is of large size; quality as good, yet I cannot say it is more productive.

Mr. Thos. Beall, Lindsay, says: Every grower of grapes for family use should have a few vines of Moore's Early; but the quantity of fruit produced is so small, it is worthless as a market variety.

The Wilder. Every year it is becoming more and more a question with the fruit growers, which he should rank first in importance, quality or productiveness, when he is planting for profit. The Concord grape for instance, is one of the most productive varieties that grows, but its quality is second-rate, and consequently the market price is every year tending downwards. Last year many growers had to content themselves with $1\frac{1}{4}$ to $1\frac{1}{2}$ cents a pound, a very low figure in consideration of the care of the vineyard, the trellising, harvesting, and purchase of baskets. Should this tendency continue, there will soon be no profit at all in growing such varieties. But with grapes of such excellent size and quality as the Wilder, there is no danger of low and unremunerative prices. By common consent this grape is counted one of the most showy of American out-door black grapes, for exhibition purposes, and one of the best for dessert purposes.

At Maplehurst this grape has not been largely planted for market, because it is somewhat subject to mildew and rot, and is not always productive. But since we have learned so well the benefit of using copper sulphate in our vineyards to destroy the fungi, there is no reason why we should not henceforth plant this variety more freely. To get the best results it should be trained on the renewal system, having two arms of old wood on the first or lower wire, and training the young growth upward. Every year the alternate uprights are to be cut out to the bud nearest the old wood, and those left will bear freely.

The Wilder, or Rogers' No. 4, was raised by Mr. E. S. Rogers, of Salem, Mass., and it is counted one of the best of his numerous hybrids, being not only large and beautiful in fruit, but the vine is also vigorous, hardy and productive.

The following description is from the Bushberg catalogue :

Bunch large, often shouldered, sometimes weighing a pound ; *berry* large, globular ; *color* dark purple, nearly black, slight bloom ; *flesh* tolerably tender, with a slight pulp, juicy, rich, pleasant and sweet. Ripens with, and sometimes earlier than the Concord, keeping for a long time. The vine is vigorous, healthy, hardy, and productive ; roots abundant, of medium thickness, straight, with a smooth, moderately firm liber ; canes heavy and long, with well developed laterals. Wood firm, with a medium pith.

The Agawam. For the dessert dish, nothing is more attractive than a collection of grapes, assorted according to color, and on this account care should be taken in planting to include about an equal quantity of red, white and black varieties. It does not matter whether for home use or for shipping, for the buyers in the large towns also have eyes for the beautiful, and will buy such packages as contain assorted colors sooner than such as have all one color.

Of red varieties, the following list was approved of by the New Jersey Horticultural Society in 1884, in order of excellence : Brighton, Agawam, Delaware, Salem, Catawba, Jefferson and Lindley. Of these, the Brighton is a general favorite, but of too thin a skin to endure a long shipment. In our opinion, the Brighton is a delicious grape. The Delaware is tender and sweet ; it is usually esteemed to possess the highest quality of any grape, and truly its delicate little berries of diminutive size seem just suited to place before royalty itself. At Chicago, the Delaware was sold in small five-pound baskets, and in three-pound pasteboard boxes, and was in great demand ; while, later in the season, the Catawba took the precedence, owing to its keeping qualities ; a grape which does not ripen well at the north, except in favored localities.

The Agawam is a seedling grape, raised by E. S. Rogers, of Salem, Mass. The vine is vigorous and productive, but in wet seasons it is liable to mildew, though not as badly as No. 22 (Salem) ; the bunch is variable in size and shape ; berries large, roundish, dark red or maroon ; flesh tender, juicy, sweet, with a native musky aroma. This is considered by many one of the best of Rogers' seedlings, but in Canada we give greater preference to the Lindley for market purposes, as being earlier and more productive, and of a brighter shade of red.

The experience of fruit growers in various parts of the province concerning this grape is shown by the following extracts from the letters just to hand :

Mr. E. Morden, Niagara Falls South, writes, "The Agawam is a very large red grape, of quality inferior to the Salem, but not quite as liable to mildew.

Thomas Beall, Lindsay, writes, "The Agawam grape is profitably grown here, principally because of its excellent keeping qualities and its fine flavor. We do not place it on the market until November, or in December, when the cheaper varieties are gone. A good price is then obtained for them. The best results seem to be obtained when grown near some variety producing more pollen.

Mr. A. M. Smith, St. Catharines, writes, "The Agawam has been very subject to mildew with me, otherwise I consider it as good as any of Rogers' red grapes."

Mr. Alexander McNeill, of Windsor, writes, "The large berry and thick skin of the Agawam make it an excellent keeper and shipper. The vine is vigorous and usually healthy, but the fruit is subject to rot. This, together with its loose and usually small bunch, render it unprofitable at even three times the price of the Concord. Those who want a fairly good grape in December or January, and will spray carefully, will find the Agawam worth planting."

Mr. John Craig, of Ottawa, writes, "The vine is a strong, free grower, inclined to mildew; bears profusely; bunch and berry large; color, dark crimson; very rich; juicy; of first quality; skin, thick; keeps well without losing its flavor. In this section it does not ripen to perfection every season. Recently it has been shown that the Agawam is one of those varieties which does not perfectly fertilize itself, and, therefore, needs to have some strong bloomer, like the Concord, growing with it to produce the best results."

Mr. M. Pettit, of the Winona Experimental Station, writes, "The Agawam, on heavy soil, with the free use of sulphur, is the most satisfactory grape I grow. It is a regular and heavy bearer, a good shipper, a good keeper, and good demand in the market.

STRAWBERRIES.

Of thirty varieties in my experimental plantation the *most productive* in the season of 1894 were Williams, Bubach, Haverland, Saunders and Enhance. The *earliest* were Michels Early, and Bubach 24, both of which gave their first picking on June 10th, while most of the others did not give their first picking until the 18th.

Bubach 5 is one of the best market berries; and always averages larger than any other variety. It is pistillate, very productive, and endures the drouth well.

Saunders compares favorably with Bubach in size and excels it in productiveness. The fruit is large, conical, slightly flattened; color, deep red; glossy; flesh red; flavor, sprightly and agreeable; excels Bubach in quality.

HINTS FROM SISTER SOCIETIES.

TRANSPLANTING ONIONS.

Mr. C. B. Waldron, of the North Dakota Experimental Station, says that his attempts to grow onions in the ordinary way have generally failed, but he has succeeded well by transplanting. For example, on April 4th, seeds of a number of varieties were sown in shallow boxes in the greenhouse. When the plants came up the average stand was about 500 to the square foot. May 23, these small onions, with a diameter slightly greater than that of an ordinary wheat straw, were transplanted to the open ground 5 inches apart in the drill. On the same date and on similar soil, seed of the same varieties were sown. The rainfall from above date until June 30 was 3.62 inches, for July 2.21, and for August 2.72.

The onions were harvested September 22. At this time all of those which had been transplanted were mature, while of the others only the early pickling sorts and the Extra Early Red had thoroughly ripened. Only 5 varieties out of 26 planted made a satisfactory stand from seed. The following table gives the relative yields from the two methods of culture :

RELATIVE YIELDS OF ONIONS TRANSPLANTED AND GROWN FROM SEED.

Variety.	Weight of transplanted.	Weight of non-transplanted.
Early Red	71	14½
Red Victoria.....	53	7
White Victoria.....	56½	11
Silver White Ætna.....	65	13
Yellow Globes Danvers	47	12

The author estimates that about 84 square feet of glass are necessary to furnish plants sufficient for one acre, and that the cost of transplanting an acre is about \$10.

When the saving of seed is taken into account, it is doubtful if the expense of growing a crop in the old way is less than by the method of transplanting. Transplanting onions produced large, regular, mature bulbs, greatly excelling the others in keeping and market qualities.

FRUIT PACKING AND GRADING.

The following hints on this important theme of packing and grading is from the Report of the Pennsylvania Horticultural Society.

Fruit and garden producers are much in need of a general system for grading. We must have legislation and co-operation as well as the enforcement of such laws enacted by our legislature. To-day, we have men authorized to inspect flour, coal, oil, whiskies, etc., placing their official mark on each article inspected. These are bought and sold by the grade as marked upon each case. Fruit is used extensively every day in every state of our Union, and yet no system of grading or inspection is in force.

Grading fruit is not simply separating the better from the inferior; there is another grading which is pre-eminent, uniform measure. Our old standard measures of a half bushel and peck have become so old-fashioned they are a mere figure-head with many fruit dealers. The per cent. of fruit and vegetables thus measured is exceedingly small. Barrels, crates, baskets, berry-boxes, etc., are now used to carry fruit and ship to distant markets. No fault is to be found with the box, barrel or crate, but in the matter of sizes specified regulations should be adopted. I have found baskets holding $\frac{5}{8}$, $\frac{1}{2}$ and 7-16 bushels. Each of these sizes is a basket of the original intention. Probably no wrong was intended, but the matter of sizes has opened the doors wide for the perpetration of fraud. The inexperienced, thinking a basket means a half bushel, offer their produce at so much per basket. The buyer brings out his $\frac{5}{8}$ -bushel basket and wants it filled round full. The farmer figures 20 bushels will fill 40 half bushel baskets, but when he counts the baskets only 32 are found. A dispute at once arises, but being sold and bought by the basket, the producer takes his pay and departs. The dealer fills his 7-16 bushel or 14 quart basket and then has 45.6 baskets. The dealer paid for 32 but now sells 45½, gaining 13½ baskets on the 20 bushels. Frequently such dealers are the loudest complainers.

We need wise legislation and the co-operation of good, honest merchants, backed by every horticultural association in the country, against tricksters of this kind. Barrels, crates, baskets, boxes, etc., should be of established sizes and so easily distinguishable that every buyer and seller knows what he buys and sells. The size of pint and quart berry boxes sometimes returned in crates is often surprising. Every manufacturer has his own notion about the size, or else in his calculation must figure on liquid measure. Crates have never been returned to me with boxes of different makes of the same size.

Careful picking, careful handling, scrupulously clean baskets and boxes, free from last year's mould and stains, add largely to quick sales and better prices. Often one poor over-ripe berry prevents the sale of the box, one inferior peach lessens the value of the

whole basket ; one bruised, brown spotted pear rots the whole basket. As there is no established schedule, I present my idea through observation at home and abroad. Fruit grading should be either for the home market or those most distant. First-class fruit should be the largest, most highly-colored and most perfectly matured growth. Second-class, fair size, with only such slight defects as debar from the first-class. Third-class, wormy, scabby, irregular. Culls, such as will not pass as third-class and rather better than need be for cider vinegar. One schedule will not do for all fruits. As the fruit differs so will its schedule.

To have a first-class pear we must try and grow it, have it well developed, gather it at the proper time, and be well colored in ripening. Study the market, using judgment in the assorting for shipment or the home market. The fruit packed in a crate should be alike in time of ripening. Never pack pears too highly ripened or the whole box may be lost. Always sell the highly ripened pears at home. Have first, second and third class, grade them carefully and wrap in thin paper to prevent chafing. Never use boxes too large ; a half bushel is large enough. The sides of the box should be planed to prevent discoloring of the fruit ; then if properly handled the fruit will open beautifully, and you will stand a good chance of receiving remunerative prices. Never ship wormy or scabby pears ; sell them at home. Neither ship with broken stems.

Peaches should be graded when the season permits. Varieties differ in size, so the number of peaches depends on the size to fill a half-bushel basket. When they run very large I grade them 60 to 70, 70 to 80, 80 to 90 or 100, 100 to 150 peaches to the half bushel. Always have the fruit uniform from top to bottom ; never put bitter, insipid, imperfect fruit at the bottom and top off with a few good peaches and a sprig of leaves — your brand will soon be known in the market. Apples are mostly sold by the barrel, having a layer at top and bottom with culls and wormy fruit between. Such apples are of but little use on the English market, for there the fruit must be uniform and well colored. It is said that three wormy apples would condemn the whole barrel. Good apples always command a fair price either at home or abroad. The continent and English market prefers red apples. In America, red, green or yellow are desirable in localities, and every grower must study the wants of his market, as only those who make apple culture a study and a business can know how much they will feel the tender touch of man's kind and proper treatment. Whether we shall have poor, scrubby, wormy, or fine well-grown, richly colored, delicious fruit, such as the ancients would have offered to their gods, is now a matter of choice with each fruit-grower.

Graded fruit or vegetables are noticed by prince and peasant, and if the peasant knows how to grade, the prince is ready to buy simply because it appears nice and catches the eye. In many instances it may not be the quality as much as the care in preparing for market. Citrus fruits represent a class of which there is no better graded in the world. Especially is this true of Florida and California oranges. The fine grading of this class of fruit was brought about a dozen years ago by a packing house on the St. John river, Fla. As they were constantly buying, they were able to grade and wrap the fruit. This soon became an established business throughout the states. Since orange shipping from Florida to Savannah first took place, the grading of the orange has taught shippers all over the country a lesson, until California ships its fine plums, apricots, peaches, pears, and other fruits, so that now it is almost as common on the stands of fruit vendors as our own.

FANCY FRUIT.

The art does not belong to everyone of putting up fruit in fancy style so as to command prices above the ordinary. The first point is, of course, to produce such fruit by extraordinary care in cultivation, manuring, pruning, etc. The great importance of an attractive label should also be considered ; white paper with blue lettering is attractive, and should have printed upon it the grower's name and the nature of the goods, grade, etc. This can easily be pasted on each wooden package.

Picking, grading and packing choice fruit is a work of art, and unless a man has it in him, he cannot learn it by reading. All fancy fruit should be wrapped in dainty wrappers, white tissue is best, with the grower's name in bright blue ink. How beauti-

fully such a label will blend with the scarlet and gold of a fancy Crawford peach ! Who could pass a box of peaches so wrapped, and placed in shallow crates in layers and rows, without buying them ? while the same person might pass a box or basket of unassorted fruit without notice. The proper grading is best done by having a packer for each grade, and when a basketful is turned out on the packing table each one selects fruit to suit his class, as, for example, extra selected, selected and 1st class ; and what remains is sold as 2nd class, if at all. A Californian packer gives the following as his system of grading peaches for market ; and in reading observe that instead of the term we use, he employs the primes, extras, and standards :

“ Before closing I will, in as few words as possible, explain my system of grading for market. Primes, or first grades, are packed 48 to 52 to the box six by four, top and bottom, or permissibly seven by four at the bottom. They must be nearly uniform in size, so as to pack square and snug, fitted in just so tight that the filled box may be set on end without its contents falling out, this holds good moreover of each and every grade.

“ Extras, or second grade, go 56 to 63 to the box, two rows of seven by four each, or, for the higher number, a bottom row of seven by five.

“ Standards, or third grade, should not exceed 80 peaches to the box, eight rows of five each top and bottom ; anything running smaller than this I rate as culls, to be used for domestic purposes or sale to the canner or dry house.”

INDEX.

	PAGE.		PAGE.
Acer ginnala	68	Early Red (Russian)	74
Affiliated Societies	20, 153	Early Victor grape	67
Agawam grape	174	Elacagnus Augustifolio	69
Allium	133	English market	151
Anemones	133	Experiment Stations	70
Anjou pear	172	Export of fruit	108
Annual meeting	5	Export trade of Beaver valley	88
Apple catalogue	25, 157	Fallowater apple	20
Apple growing, Co-operative	94	Fameuse apple	26
Apples at Orillia	118	Farrell grape	18
" district lists of	162	Fay's prolific current	56
" for Simcoe Co.	19	Fertilization of flowers in orchards	96
" grown about Collingwood	106	Finance Committee, Report of	64
" pruning	131	Flemish Beauty pears in the Beaver valley ..	90
" seedling	74	Floriculture	57
" spraying	34	Flowers	56
Apricots	66	Frauds in fruit	14
August flowers	146	Fruit canning	155
Awards for collections	122	Fruit, Fancy	177
Beaver valley	86	Fruit Growers' Association	61
Beekeeping	142	Fruit, Packing and grading	176
Ben Davis apple	20, 25, 170	Fruits tested by Association	65
Black knot	12	Fungi	8
Blenheim Orange apple	20, 167	Fungi, Remedies for	11
Bombarger, Russian	77	Gardening	144
Bordeaux mixture	12, 115, 125	Gideon apple	16, 75
Brilliant grape	18	Glass seedling plum	67
Bubach strawberry	18, 68, 93, 175	Gloria de Dijon	148
Bulbs	132	Gloxinia	136
Burnet grape	67	Golden Queen	68
Canada Baldwin apple	66	Golden Russet	20
Canada Red apple	168	Goodale pear	67
Canadian apples in England	53	Grades of apples	108
Canning fruit	155	Grading fruit	176
Caragana arborescens	68	Grape catalogue	23, 159
Carnie's gooseberry	71	Grapes and their development	165
Cataraqui	78	Grapes at Orillia	119
Cherries, spraying	37	Grapes, Classification according to self polli- nation	98
Cold storage construction	111	Grapes, District lists of	163
Cold Storage experiments	110	Grapes, Prices of	24
Cold storage in fruit centres	109	Grapes, Self fertile	102
Codling moth	122	Grapes, Unfruitful	97
Colvert	19	Green Crimean apple	77
Concord grape	166	Green fruits, Import of	6
Constitution	3	Haas apple	16
Crescent strawberry	18, 93	Hartford prolific grape	166
Cross	75	Hawkeye plum	17
Cuthbert raspberry	18	Hedges	148
Dempsey pear	114, 172	Higher horticulture	60
District fruit lists	162	Hillborn raspberry	68
Dried fruit, Import of	6	Horticultural Societies	20, 153
Duchess apple	19, 26		

	PAGE.
Howell pear.....	172
Inspection of fruit.....	119
Inspection of orchards.....	152
Isabella grape.....	166
Jacqueminot rose.....	138
Jessie strawberry.....	68
Judging, Catalogue for.....	137
Judging fruit.....	27
Judging potatoes.....	30
Kerosene emulsion.....	116
Laxton's noble strawberry.....	71
Lee's Prolific currant.....	66
Lilies.....	133
Local societies.....	4, 20
Longfield apple.....	16, 75
Lucretia dewberry.....	65
McIntosh red apple.....	16
McMahan white apple.....	16, 75
Mann apple.....	20
Marlboro' raspberry.....	68
Mildews.....	9
Mills grape.....	18, 67
Moldavka plum.....	17, 74
Moore's Early grape.....	67, 173
Mushrooms.....	11
New fruit committee.....	83
New fruit report condensed.....	78
New fruits examined.....	71
Niagara grape.....	67
Nicol, D.....	7, 85
Nursery stock, Import of.....	7
Officers.....	2
Onions, Transplanting.....	175
Ontario apple.....	65
Ontario fruit growers.....	112
Ontario strawberry.....	68
Orange winter.....	75
Ostheim cherry.....	66
Oxalis.....	135
Packing fruit.....	52, 108, 176
Packing peaches.....	142
Paris green with Bordeaux mixture.....	45
Peabody grape.....	18
Peaches in the Beaver valley.....	89
Peaches, Packing.....	141
Peaches, Seedling.....	74
Peaches, Spraying.....	33
Pear catalogue.....	161
Pears at Orillia.....	119
Pears, Spraying.....	37
Pear tree psylla.....	126
Pewaukee apple.....	20
Planting strawberries.....	91
Plowing an orchard.....	114
Plum curculio.....	122
Plum growing about Collingwood.....	106
Plums, New.....	71
Plums, Spraying.....	36
Potatoes, Judging.....	30
Prentiss grape.....	67

	PAGE.
President's address.....	5
Princess Louise apple.....	66
Pruning.....	131
Prunus pumila.....	69
Prunus Simoni.....	67
Red Canada.....	168
Resolution.....	140
Ribston Pippin apple.....	20
Roads and road-making.....	46, 59
Roses.....	138, 147
Roxbury Russet.....	20
Salome apple.....	16, 75
Sarah raspberry.....	69, 169
Saunders' raspberries.....	67
Saunders' strawberry.....	175
Score cards for judging.....	27, 117, 122
Scott's winter apple.....	16, 75
Secretary grape.....	18
Seedling apples.....	79
Seedlings.....	78
Seeds from Russia.....	151
Senasque grape.....	67
Shaffer raspberry.....	68
Shipping fruit.....	52
Sin. birsk No. 5.....	77
Snow apple.....	19
Spraying calendar.....	42
Spraying in 1894.....	31
Spraying, Report on.....	31
Stoddard plum.....	17
Strawberries, Varieties of.....	92, 150
Strawberry culture.....	154
Strawberry growing.....	90, 149
Sulphate of copper.....	44
Superlative raspberry.....	18
Swazie pomme grise apple.....	65
Talman Sweet apple.....	20, 27, 169
Thanks to Hon. A. R. Angers.....	122
Timbrell strawberry.....	18
Tomatoes, Judging.....	30
Treasurer's report.....	64
Tree planting.....	59
Tulips and hyacinths.....	134
Twenty ounce pippin.....	20
Vegetable gardening.....	143
Vergennes grape.....	67
Vladimir cherry.....	66
Wagener apple.....	20
Wallbridge apple.....	20
Wealthy apple.....	19, 65
Wilder grape.....	174
Willard plum.....	19
William Allen Richardson rose.....	148
William's strawberry.....	68
Winter Duchess.....	16
Winter St. Lawrence apple.....	78
Woolverton strawberry.....	93
World's Fair medal.....	150
Worden grape.....	67
Yellow transparent apple.....	66

FIRST 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.

1894.

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

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.



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1895.



REPORT OF
FRUIT EXPERIMENT STATIONS OF ONTARIO.

GUELPH, 17th December, 1894.

To the Honorable Minister of Agriculture :

SIR.—In presenting to you the first Annual Report of the Board of Control of the Fruit Experiment Stations of Ontario, which have been established by your authority, we desire to call your attention to the progress which has been made in the experimental work in so short a time after its inception.

The experimenters thus far chosen, being practical fruit growers of long experience, are able at once to give us many valuable results of experimental work carried on at their own expense during past years.

The tabular statements which are included in this report are very incomplete, owing to the fact that the experimenters did not receive their forms until late in the season. Another year we may expect that these forms will be filled in much more in detail. The descriptive tables, when completed, will form a full and reliable description of all the varieties of fruits grown and tested in our province, showing their exact value for planters, and the use for which they are adapted. The newer varieties of fruits will also be fully described and their value given as quickly as they can be thoroughly tested, and it is hoped that fruit growers will not be led to waste money in novelties, as hitherto, but defer buying them, unless for private testing, until they have received the approval of some one of our experiment stations. The tables of station records are intended to give a complete account of the various experiments that are being conducted each year at the different stations under the direction of the executive committee, and these will prove, from year to year, a source of most valuable information to practical fruit growers.

The plan adopted for our work is quite unique, and therefore, when fully developed, should command the especial attention of horticulturists of every country.

We have the honor to be, Sir,
Your obedient servants,

JAMES MILLS,
Chairman, Guelph, Ont.

L. WOOLVERTON,
Secretary, Grimsby, Ont.

December, 1894.

BOARD OF CONTROL, 1895.

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 1895.

A. M. SMITH St. Catharines.
 A. H. PETTIT Grimsby.
 W. E. WELLINGTON Toronto.
 L. WOOLVERTON, Secretary Grimsby.

EXECUTIVE COMMITTEE.

Chairman—JAMES MILLS, M.A., LL.D. President of the Ontario Agricultural
 College, Guelph.
Secretary—L. WOOLVERTON, M.A. Secretary of the Ontario Fruit Growers'
 Association, Grimsby.
Official Visitor—H. L. HUTT, B.S.A. Horticulturist of the Ontario Agricul-
 tural College, Guelph.

STATIONS ESTABLISHED, 1894.

<i>Stations.</i>	<i>Specialty.</i>	<i>Experimenter.</i>
<i>Bay of Quinte :</i>		
Northumberland, Prince Edward and Hastings	Apples and Pears	W. H. Dempsey, Trenton.
<i>Simcoe :</i>		
Simcoe and Victoria	Apples	G. C. Caston, Craighurst.
<i>Wentworth :</i>		
Wentworth, Brant and Oxford	Grapes	M. Pettit, Winona.
<i>Southwestern :</i>		
Essex, Kent, Elgin and Norfolk	Peaches and Strawberries	W. W. Hillborn, Leamington.

FRUIT EXPERIMENT STATIONS OF ONTARIO.

ORGANIZATION.

At a meeting of the Fruit Growers' Association of Ontario at Peterboro' in December, 1893, a committee was appointed to devise a practical scheme for experimental horticulture, contemplating several small stations. The gentlemen comprising this committee were Messrs. John Craig, Horticulturist of the Dominion Experimental Farms, Ottawa, A. McNeill, of Windsor, and W. W. Hillborn, of Leamington.

This committee prepared the accompanying scheme, and submitted it to the members of the directorate through the Secretary for their approval. The directorate having approved of it, the scheme was brought before the Hon. John Dryden, Minister of Agriculture, on the 13th March, by two members of the executive—the Vice-President and the Secretary—accompanied by Mr. W. M. Orr, a director, and Mr. A. McNeill of the committee, and received his partial approval. Mr. Dryden was desirous of knowing the names of the experimenters and the location of the stations.

In order to do this, it was necessary to elect a Board of Control. Votes were called for by the Secretary, and on March 31st, the Vice-President and the Secretary acting as scrutineers, these were counted. The result was the election of the following gentlemen to represent the Fruit Growers' Association on the Board of Control, viz., Messrs. A. H. Pettit, A. M. Smith and D. Nicol.

FIRST MEETING OF THE BOARD OF CONTROL.

The first meeting of the Board of Control was held at Guelph at the Agricultural College, on Wednesday evening, April 5th, 1894, at the call of President Mills.

There were present Dr. James Mills, President of the Ontario Agricultural College Guelph, (*ex officio*) Chairman; Mr. H. L. Hutt, Horticulturist, O.A.C., Official Visitor to Stations; Mr. A. H. Pettit, Mr. A. M. Smith and Mr. L. Woolverton, Secretary of the Fruit Growers' Association of Ontario and *ex officio* member of the Board.

The Secretary first read the scheme which was carefully considered, and was ordered to record certain changes in the wording. The changes are incorporated in the text of the scheme as follows:

FRUIT EXPERIMENT STATIONS FOR THE PROVINCE OF ONTARIO.

The exhibits of fruit made by Ontario at the World's Columbian Exposition gave to the world a truer conception of the possibilities and attainments of the province. It also inspired the fruit growers of the province with a better appreciation of the capability of her soil and climate for the production of fruit—that "flower of commodities"—in its highest state of excellence. It has also emphasized in a general way the fact that every variety of fruit varies in respect to appearance and quality according to the soil and locality in which it is produced, and has a greater or less area in which it reaches most nearly perfect development.

Our knowledge of the variations in habit of growth and quality of the fruit due to soil and climatic effects is vague and undefined, and data with regard to the relative success of varieties in different sections is lacking. The fruit interests of the province suffer in consequence.

The Fruit Growers' Association of Ontario has long recognized the advantage that would result from establishing a system of experiment stations, particularly designed to collect information of this character and to promote the fruit interests of this province generally. That they are sincere in the matter is attested by the fact that a standing committee was appointed three years ago, whose duty it was to do everything in its power to bring the scheme to a successful completion. This committee has interviewed the Government annually, but thus far without any definite results.

The fruit growers of Ontario fully appreciate the liberality with which they have been treated by the Provincial Government, but are assured that the good use made of their grant has more than justified the expenditure. In witness of which they point with pride to their journal, the *Canadian Horticulturist*, which has a circulation as wide as the continent, is well known in Europe, and is recognized as the official organ of the fruit growers of the Dominion.

In view of the large capital invested and the annual revenue derived from the fruit industry of the province, which, according to recent statistics is second only in value to the hay crop, which takes the lead, your petitioners feel that they are justified in laying their desires before you with full assurance that they will receive at your hands that consideration which their importance deserves.

It is believed that the fruit interests of the province cannot be served best by the establishment of a single experiment station, no matter where it might be located, and, further, that results more useful and more immediately available would be obtained by the establishment of a number of small and inexpensive trial experiment stations. These might be carried on in co-operation with the various fruit growers in different parts of the province, who already are specialists and have made a financial success of growing one or more classes of fruit. For example, the services of a grape specialist, or a plum or peach grower might be secured with all the advantages accruing from knowledge gained by practical experience.

ORGANIZATION.

The Board of Control shall consist of the President and the Horticulturist of the Ontario Agricultural College and three members of the Fruit Growers' Association elected by the directors of that body, with the secretary of that body as *ex officio* member.

The line of work to be pursued by each station shall be decided upon by the Board of Control and shall be submitted to the directors at the time of the annual meeting of the Fruit Growers' Association for approval; together with a full report of the work of the year, for incorporation in the annual report.

A local committee for each station, whose duty it will be to carry out the directions of the general Board of Control, shall consist of the experimenter and the director of that district, acting with the Secretary of the Fruit Growers' Association.

All plants shall be purchased by the Secretary of the Fruit Growers' Association after consultation with the experimenter, subject to the approval of the Board of Control.

EXPERIMENTERS AND THEIR DUTIES.

Each experimenter should be a specialist and should have suitable soil for the cultivation of the particular class of fruit of his own choosing which is mainly to be tested at the station of which he has charge. He shall be elected by vote of the Board of Control subject to the approval of the directors of the Fruit Growers' Association; and in case of incapacity or dereliction of duty shall be dismissed and his place filled by action of the same body.

The experimenters shall be members of the Fruit Growers' Association of Ontario.

The first duty of each shall consist of making an accurate and trustworthy report of all varieties of the particular fruit assigned which he has on trial up to date. To this list shall then be added all the desirable sorts of late introductions. These shall be obtained by the Secretary of the Fruit Growers' Association, in consultation with the other two members of the executive committee, subject to the approval of the Board of Control, and shall be properly planted, carefully recorded and labelled.

The Board of Control shall have power to arrange and manage all details in regard to perfecting the organization not otherwise provided for.

COLLECTION AND DIFFUSION OF INFORMATION.

Brief reports shall be rendered to the editor of the *Canadian Horticulturist* for publication in that journal, once in two months during the growing season; and a complete report not later than the 15th of November of each year shall be forwarded to the Horticulturist of the Ontario Agricultural College for publication, if deemed by him to be sufficiently important.

It is suggested that one or more annual visits be made to each station by the Horticulturist of the Ontario Agricultural College, at the periods most favorable for securing information for publication in bulletin form, and pointing out to the secretary any faults observable in the station, as well as indicating useful lines of work which might be inaugurated. At the time of these visits he will be received by the experimenter as the official representative of the Board of Control as well as of the Government.

EXPENDITURE.

It is suggested that ten trial stations be organized and located as follows.

It is believed that an appropriation of \$2,000 will be sufficient to initiate and carry on this work successfully, including the purchase of plants for each station the first and succeeding years.

No. 1. Apples and pears	Located	; managed by
No. 2. Apples	Located	; managed by
No. 3. Apples and plums.....	Located	; managed by
No. 4. Peaches and strawberries	Located	; managed by
No. 5. Plums and cherries	Located	; managed by
No. 6. Grapes	Located	; managed by
No. 7. Cherries and small fruits.....	Located	; managed by
No. 8. Grapes and currants	Located	; managed by
No. 9. Strawberries and peaches	Located	; managed by
No. 10. Gooseberries and raspberries.....	Located	; managed by
Contingencies.....		

ESTIMATED EXPENDITURE FOR 1894.

Five stations at \$100	\$500 00
Trees, plants, etc.....	200 00
Clerical work—corresponding with stations, purchasing stock for each, keeping lists, making tabulated statements for publication	50 00
Meetings of Board of Control	75 00
Travelling expenses of official visitors.....	75 00
Contingent fund.....	100 00
	\$1,000 00

STATIONS PROPOSED TO BE ESTABLISHED IN THE SPRING OF 1894.

No. 1. Apples, pears (and small fruits)	\$100 00
Located in Prince Edward Co.	
Managed by W. H. Dempsey, Trenton.	
No. 2. Hardy apples, (strawberries, currants, raspberries and hardy cherries)	100 00
Located in Simcoe Co.	
Managed by G. C. Caston, Craighurst.	
No. 3. Plums, apples, (pears, grapes and small fruits)....	100 00
Located in Huron Co.	
Managed by	
No. 8. Grapes, (currants, plums, pears, and blackberries).....	100 00
Located in Wentworth Co	
Managed by M. Pettit, Winona.	
No. 9. Peaches and strawberries, (currants, cherries, gooseberries, raspberries, plums and quinces)	100 00
Located in Essex Co.	
Managed by W. W. Hillborn, Leamington.	

EXPERIMENTER'S AGREEMENT.

I, _____ of the County of _____ and Province of Ontario, do promise and agree to plant properly and carefully all fruit trees and plants entrusted to me for experimental purposes, and to give them proper care in the way of cultivation and pruning, and that I will keep a record of the same and report as to the growth of the trees and plants, their hardiness, etc., size and quality of the fruit, time of ripening, and all other information required, within my power and ability to give. I will be guided by the Board of Control in making these reports, and report when and to whom they may direct. I further agree to be guided by the Executive Board as to plan and methods of experimental work entrusted to me. I also agree to give any information I can to or asked for by the Horticulturist of the Ontario Agricultural College, or by the Secretary the Fruit Growers' Association of Ontario.

In consideration of faithfully carrying out the experimental work as outlined above, and making reports as directed, I am to receive annually the sum of _____ dollars. All trees, plants, etc., entrusted to me for experimental work, when once planted shall become my property, but not to be used in any way to advance personal ends, such as controlling or propagating new varieties; and I further bind myself not to give away or sell any trees, plants, buds or scions of any varieties entrusted to me for testing, except with the express permission of the owner of the same.

Should I fail to carry out the wishes of the Board of Control, I hereby agree to forfeit all or any part of my annual grant as considered right and just by the said Board of Control.

(Signed).....

Dated _____

FINANCES.

The question of finances was taken up, and it was ordered that the elective members of this Board be allowed \$2 per day and their expenses in attendance on meetings of this Board.

Ordered that \$100 be allowed each experimenter for his services during the present year, and that five stations be established, providing suitable men and locations are obtainable.

Ordered, that the sum of \$200 be set aside for the purchase of trees, plants, etc., for the first year.

Ordered that \$50 be allowed for the necessary clerical work, correspondence with stations, purchasing stock for each, keeping lists, making tabulated statements for publication, etc.

Adjourned.

JAMES MILLS, Chairman.

L. WOOLVERTON, Secretary.

NOTES OF WORK.

In April your Secretary entered into correspondence with those experimenters who had been chosen by the Board of Control, sending them copies of the scheme and the agreement between the Executive Committee and the experimenters, asking that these be duly signed and returned, in case it was the desire of the person addressed to enter upon the work. These conditions were duly accepted, and the agreement properly signed and returned to the Secretary by Messrs. G. C. Caston, of Craighurst; M. Pettit, of Winona; W. H. Dempsey, of Trenton; and W. W. Hillborn, of Leamington.

The next step was to ask from each a complete list of the varieties of fruits which had already been grown by him. These were promptly sent in by the experimenters, and the lists were arranged alphabetically for each station in separate books, with space allowed for additional entries from year to year. This record in the hands of the Executive is most important, so that in ordering new stock for the stations, there will be no danger of duplicating varieties.

I append a copy of these lists of varieties of fruits which are now under test at the various stations. The intention is to fit out each station with all the known varieties of their specialty which have promise of any value in our province, and a limited list of other fruits also, as far as possible. In this way the adaptability of new fruits of different kinds may be specially tested in various parts of our province. Most of the experimenters, we may add, have signified their intention of devoting a certain plot of ground to experimental work with novelties, in addition to those trees and plants which may be planted in their regular commercial orchards.

BLANK FORMS AND FIELD BOOKS.

On the 25th of May a meeting of the executive was held, at which a general outline was agreed upon for the blank forms and record books to be prepared for the use of the various experimenters in keeping a record of their work, and in reporting the same to the secretary for publication in the report of the Board of Control, a duplicate copy of which is also to be sent to Mr. H. L. Hutt, Horticulturist of the Agricultural College, Guelph, from which he may gather material for bulletins for other special publications. These bulletins will be published separately and also included in the report of the Board of Control. These blank forms were duly prepared in detail by the secretary and, as soon as they were received from the printers, which was not until after a considerable delay, each station was furnished with an abundant supply of copies. Small field books were also prepared for the use of the experimenters, which embraced the same headings as were required in the blank forms, but in a convenient form to be carried in the pocket. The printer's bill for these blank forms was heavy, but the stock is sufficient to furnish the ten proposed experiment stations for some years to come.

VISITS TO FRUIT STATIONS.

In accordance with the instructions of the Board of Control, Mr. Hutt and the Secretary spent a considerable amount of time in visiting the stations already established, in order to know exactly the form which the work was assuming at each station, and also in visiting those places from which request had been received for the establishment of new stations. Following are reports of official visits :

THE SOUTH-WESTERN STATION.

On Friday, the 15th of June, we visited the Experiment Station in Essex Co. Leamington is prettily situated on the shore of Lake Erie, and the soil in that vicinity is mostly light sand, well adapted to the cultivation of the peach. The farm of Mr. W. W. Hillborn, our experimenter, is situated in the heart of this favored locality, and is being almost entirely devoted to the cultivation of the peach and strawberry. Of the latter he has about six acres in full bearing, and has already tested more than one hundred varieties. Of the kinds now in cultivation, he prefers for market purposes, Bubach 24, Williams, Wilson, Saunders and Woolverton. As an early berry, Mr. Hillborn prefers the Beder Wood to Michel's Early, because it is just as early and much more productive, and for a late berry the Parker Earl, which is about as productive as Bubach 5, and is a fine showy berry. The plants have peculiar habit of growth, not spreading as much as other berries, but keeping well in hills. For a table berry the Governor Hoard is good, having an extra fine flavor. The Middlefield is not a good market berry. The foliage is very healthy and beautiful, but does not endure drouth very well. One sample of this variety measured one and five-eighths inches in length by one and three-quarters in breadth. But Mr. Hillborn's great specialty is in the cultivation of the peach. He has already planted about sixty acres of this fruit, and is to plant out about fifty acres more in the spring of 1895. When planted, his will be the largest peach orchard in Canada. He has laid out his orchard in a systematical way, in the manner of the streets of a town. The large drives or streets are thirty feet in width, and the blocks contain five hundred trees each, with twenty rows in each block. His plan is to number the block, then the rows and the trees in each row. His record book then will enable one to find at once any variety in any part of the orchard. The light sandy soil of this locality, which is very dry and naturally well drained, though rather too light for strawberries, is exactly suited to the cultivation of the peach. The fruit seems scarcely ever to fail to produce a crop. It was stated by one of the fruit growers in that section that there had not been more than one or two total failures during the past fifteen years. There is some inconvenience in shipping to Toronto on account of the poor railway connection, so their principal shipments are made to Buffalo, London, Detroit, Sarnia and St. Thomas.

Mr. Hillborn's method of protecting his trees from the peach tree borer is worthy of notice. To thirty gallons of water he adds equal parts of lime and ashes, about one bushel of each; to this he adds one pint of crude carbolic acid. With this mixture the trees are whitewashed, and he claims that this will be a perfect protection.

Adjoining Mr. Hillborn's farm are two other fruit farms, which we visited with considerable interest. One of them belongs to Mr. John Mitchell, who has about twenty-five acres in fruit, and about ten of these in peaches. The variety which he has planted most largely is the Yellow Albridge. He has also planted the Crawford, Tyhurst Seedling, and numerous other varieties. His orchard is remarkable as an example of shortening-in. He heads his trees about a foot and a half from the ground from the very first. He goes over his trees every year, in the month of June, with his shears pruning off about one-half the young growth. This applies to them the same principle that is often recommended for pruning grapes, namely, pinching off the young shoots, leaving two or three leaves beyond each bunch of grapes. In the same manner Mr. Mitchell leaves two or three leaves beyond the last peach of each limb. His trees are remarkably compact, no long straggling growth has ever been allowed, and though many of them were eight or ten years planted, they did not spread over more ground than many trees unpruned would do in half the time. He finds this method more convenient in picking,

besides the bearing wood is kept in a dense head, and the tree lives to a much greater age. His apple orchard was well cultivated, and the trees beautifully formed. He is applying the same method of shortening-in to his apple orchard that he does to the peach. When taking us to visit his apple orchard, we drew his attention to the apple scab which was beginning to affect the leaves and fruit. He was surprised, and said that it had certainly appeared within the last few days. Upon further inquiry in other parts of Ontario, we find that this fungus has suddenly appeared between the 10th and 20th of June, owing to the very hot weather succeeding the wet season. In Mr. Mitchell's orchard the Ben Davis and Greening apples are ruined with the scab, and are rapidly dropping to the ground. Otherwise there would have been an unusually fine crop. Not only were the apples falling to the ground in many orchards in Essex, but the leaves also are suddenly turning black, all the result of this apple scab. Since returning home we have examined the apple orchards at Maplehurst, and found that where the Bordeaux mixture has been faithfully applied the scab has been largely kept in check. No doubt the present season will be a clear proof of the benefit and efficacy of copper sulphate in preventing this evil.

THE SIMCOE STATION.

On the 23rd of June we visited the Craighurst station, which is located in Simcoe county, about twelve miles northwest of Barrie, on the Penetanguishene road. Fruit-growing in that section of the country is not nearly as extensively engaged in as it might be. Now and then a nice young orchard may be found, and occasionally a well-kept plantation of small fruits, but the majority of farmers there seem to be satisfied along that line with what nature has done for them, and she has certainly dealt with them very liberally, for strawberries, raspberries and plums grow wild in abundance. One of the direct benefits of the experiment station in that section will be to show those who visit it how much more abundantly she will deal with them when improved varieties are selected and given good cultivation. And probably no better man in that section could be selected to demonstrate this fact than Mr. Caston, the manager of the Craighurst station. Mr. Caston is an enthusiastic, energetic fruit grower. He was the first man in that section to pack apples in barrels for shipment, previous to which they had always been sold by the bushel or bag in the local markets. The soil at the Craighurst station is a light, sandy loam, with a retentive subsoil, and, on account of its great uniformity, it is admirably adapted for experimental work. Mr. Caston has not confined his attention to the growing of any one particular fruit, but has done more or less with them all. Apples, however, have been most extensively grown, and of these he has a thrifty young orchard in full bearing, containing a large number of varieties. A number of new varieties were set out last spring, and he has in the nursery about eighty Russian varieties ready for planting next spring. The Duchess of Oldenburg, a favorite in most places, seems to do particularly well in that section. Many of the trees of this variety were breaking down under their load. Mr. Caston says that they have borne heavily almost every year ever since they were planted, and that, on account of the brisk demand for them in the northern markets, he has found it to be one of his most profitable varieties. On account of the ease with which it may be grown, and its natural exemption from the apple scab, it may well be called the "lazy man's apple." At Craighurst, as in other parts of the country, the apple scab is very bad this year. To it may be attributed the general falling off of the apple crop, which at first appeared so promising. Every year it becomes more and more evident that spraying must be adopted if full crops of fruit are to be obtained. And since the Bordeaux mixture has proved to be a successful preventive of the apple scab and similar fungous diseases, the wide-awake fruit grower may look on these as friends in disguise, as they simply give to him who sprays the monopoly of the fruit trade.

At the time of our visit to Craighurst the raspberries were at their best. Among the reds the Cuthbert still proves to be the "queen of the market." The bushes of this variety were laden with large, bright, firm berries, which stand shipment well. The Shafter is also an excellent variety. In points of flavor and productiveness we are inclined to think it surpasses its more favored rival, the Cuthbert, but its lack of firmness and

dark color makes it a poor market berry. For canning and home use, however, it should have a place in every garden. In fruit and habit of growth the Shaffer is intermediate between the red raspberry and the black cap. We noticed, also, that, like the black cap, its canes are this year badly affected with the anthracnose, another disease, which can easily be held in check by the Bordeaux mixture. The large blackberries are not much grown in that part of the country, and it is generally supposed they are too tender to stand the winter, but the great crop on those of the Snyder variety at Mr. Caston's plainly shows what can be done. It certainly was a treat to look at.

Mr. Caston has tested in the past quite a variety of strawberries, and has this year added to his collection a large number of new varieties. The Crescent and Wilson have always been his favorites for the market, but he is inclined to think that these old varieties may have to give place to some of the newer ones, such as the Bubach, Bederwood, Parker Earle, and Woolverton.

Grapes at that section have not proved a success, although a number of varieties have been tried, the seasons, as a rule, being too short to ripen the fruit. Gooseberries and currants do well. A number of varieties were set out last spring, and it is hoped that in a few years some valuable information may be gleaned from these.

THE WENTWORTH STATION.

Winona is on the southern division of the main line of the Grand Trunk Railway, about ten miles east of Hamilton and three or four miles west of Grimsby village. The soil in that section is generally a rather heavy clay loam. To many its hard, red appearance might make it appear as unsuitable for fruit land, but the immense crops of plums, pears and grapes raised there show what it is capable of doing. In some places, especially toward the "mountain," the soil is lighter and more of a sandy loam, like that at Grimsby. It is on such soil that the peaches are grown.

The amount of fruit shipped every day from Winona during the fruit season is something enormous. A number of the most extensive growers in the neighborhood have built substantial fruit houses at the railway station, where they haul and store their fruit, and ship from day to day as convenient, or according to the demands of the market. At the time of our visit five cars were being filled, principally with grapes and pears.

Mr. Pettit's farm is only a few minutes' drive from the station, on the main road running along the base of the mountain from Hamilton through Grimsby to Niagara. The Hamilton, Grimsby and Beamsville electric road, recently opened, runs through the centre of the place. There are about one hundred and seventy acres in the farm, about seventy of which are in fruit.

The vineyard covers an area of about twenty acres, and is made up of a succession of blocks of about four acres each, so laid out that cultivation can be given through these from one end of the yard to the other, a distance considerably over a quarter of a mile. Mr. Pettit is a thorough cultivator, and his vineyard is worthy of an inspection at any time. A large photograph of it was shown last year in the Canadian fruit section in the World's Fair at Chicago. In this vineyard there are over eighty varieties of grapes in full bearing. To enable him to become thoroughly familiar with all his varieties, Mr. Pettit has planted a vine of each variety along the drive running through the vineyard, and these are labelled, so that they can readily be seen when driving through. Out of all this large list Mr. Pettit gives the following as some of his most profitable varieties: Black—Worden, Wilder and Concord Red—Lindley, Agawam, Delaware and Catawba. White—Niagara and Moore's Diamond.

We were much pleased with Mr. Pettit's method of marketing his large crop. Unlike the majority of growers, he does not ship everything to one market, to be disposed of by commission men as best they can, but instead he has secured regular customers in the retail dealers in various parts of the country. With most of these he has telephone communication, and fills their orders, large or small, from day to day as required. In this way he was shipping from one to two tons per day, and was receiving from one to two cents per pound more than those who were shipping steadily to the large and usually glutted markets.

In addition to the grapes, Mr. Pettit has a large orchard of pears and plums. These fruits do particularly well upon the heavy soil in that locality. This past season, however, the trees suffered much from the drouth, and the fruit was not up to the average. The varieties in greatest favor there for profit, named in order of ripening, are: Beurre Giffard, Bartlett's, Flemish Beauty, Duchess and Keiffer.

Out of ten varieties of plums in bearing Mr. Pettit mentioned the following as his most profitable varieties: Lombard, Washington, Bradshaw, Yellow Egg and Reine Claude. Fourteen new varieties were added to the varieties of plums last spring, and when these come into full bearing no doubt the above lists will be considerably altered.

The plot planted with new varieties last spring is about two acres in extent, and is located so that it can be enlarged as the work progresses. The soil is all of a uniform character, an important requisite in conducting variety tests. The newly planted collection includes 23 varieties of grapes, 27 of peaches, 14 of plums, 10 of cherries, 9 of currants, 5 of gooseberries, 6 of raspberries, and 16 of strawberries. From these, in addition to the large number of varieties already in bearing, it is expected that some valuable information will soon be obtained.

THE BAY OF QUINTE STATION.

During the month of September a visit was paid to the apple and pear experiment station near Trenton, which is managed by Mr. W. H. Dempsey, a son of the late P. C. Dempsey, so many years a prominent director of the Ontario Fruit Growers' Association. Here we found a most extended list of apples already under cultivation. Mr. P. C. Dempsey had always delighted in experimental work and in hybridizing, as well as testing all the varieties he could procure from far and near. As a result there are already under cultivation at this station nearly 150 varieties of apples and a very large number of pears, many of them having been top-grafted upon trees of bearing size, and thus a large number have already been tested, and the results can be made public at an early date. Many varieties that have been highly commended and introduced with a great flourish have proved to be totally worthless, and will therefore be reported upon and no longer recommended for cultivation. Other varieties are very promising and will be planted more extensively and reported upon more fully from time to time.

Mr. Dempsey's farm, which consists of over 200 acres, is remarkably well adapted to the cultivation of apples and pears, and is situated part of it in the county of Northumberland and part in the county of Prince Edward. From an eminence nearly 300 feet high, in the rear of his orchard, portions of three counties are in plain view, and the scenery is magnificent. Up the sides of this hill a large vineyard was planted many years ago; but, owing to the difficulty of cultivation, and to the fact that grapes are not the most profitable fruit to grow in this locality, this vineyard has of late years received little attention. Mr. Dempsey has 40 acres of apple orchard in bearing, and in some portions the crop is remarkably fine, even this season, but in other parts there is very little fruit.

One of the most productive varieties is the well-known and popular Fameuse, which is difficult to grow free from scab. The greater part of Mr. Dempsey's crop will be first quality, and will bring him the highest market prices. Two trees of this variety fourteen years planted will, he estimates, yield him ten barrels of shipping apples.

The Ben Davis is one of Mr. Dempsey's favorites for profit, his trees yielding him fine crops of smooth, clear apples. He says it sells equally well with the Baldwin, and is, of late years, more productive. Four trees of this variety twelve years planted yielded him 25 barrels of shipping apples in 1892.

Another apple which Mr. Dempsey considers one of the very best for profit is the Ontario. He has quite a number of trees top-grafted to this variety, and all are loaded heavily with large, clear fruit. Mr. Dempsey says he can confirm everything good that has been said of this apple in any of the reports of the Fruit Growers' Association. It needs good cultivation, and should be thinned, as it is inclined to overbear. In the market he sees little difference in the selling prices of this variety, and the Northern Spy, both being considered equally desirable by buyers. Indeed, few buyers can distinguish

one from the other. In productiveness it is equal to the Ben Davis. It will be remembered that the Ontario is a cross between the Northern Spy and the Wagener, produced by the late Charles Arnold of Paris, and distributed by the Fruit Growers' Association in the year 1879.

Baldwins in some portions of Mr. Dempsey's orchard are well laden with fruit of fine size and color.

There are probably 100 varieties of apples which have been tested by Mr. Dempsey, which he would not recommend for general planting; such as Mountain Beet, which loads well, but is of little value; the Lady, which was once in great demand, but now, on account of its extremely small size, is no competitor for the fine varieties under general cultivation; Seek-No-Farther which does not give a sufficient quantity of fruit to make it profitable. There are whole rows of trees grafted to hybrids between Spy and Russet, not one of which appear to be of any value. There are 100 trees of Bailey Sweet top grafted to Golden Russet, which yield fine fruit, but the union between these two varieties is so incomplete that the trees are gradually breaking off at the place where they were top-grafted. Mr. Dempsey has not yet tried grafting the King upon the Golden Sweet, but says that Mr. W. R. Dempsey of Albury, has grafted the King upon the Red Astracan and upon the Pound Sweet, and finds it productive. The King apple is one of the highest priced apples in the English markets, but, as commonly grown, is very unproductive. Possibly experiments in the future will prove that when top-grafted upon certain other varieties it may produce more abundantly.

Mr. P. C. Dempsey's name will long be handed through future generations of horticulturists by means of some of the valuable varieties which have been produced through his genius and patient experiments, one of which is the well-known Dempsey pear. A visit was made to the original tree of the Dempsey pear, which stands upon the old home-stand of the Dempsey family at Albury, where a large number of varieties of pears have been tested. The tree has been carefully cut for propagating purposes, but, notwithstanding, has produced good crops of fruit, which are all carefully preserved for the purpose of introducing this pear to the trade. A Canadian nursery firm has purchased the right of its propagating for a considerable sum.

Mr. Dempsey is planning to set aside a few acres of ground for special experimental work in pears, and here all varieties furnished him by the Board of Control will be planted and tested.

On the whole, the Committee of Inspection is able to report to the Minister of Agriculture that the experimental work which has been undertaken is progressing favorably, and promises even better results than were at first anticipated. The experimenters and locations have been most carefully selected, and it is evident that in no instance has there been as yet any mistake made in the appointments.

THE GEORGIAN BAY STATION.

About the middle of September we visited the Beaver Valley, to consider its claims as the location for a plum experiment station. From Thornbury, near Meaford, this valley winds among the heights of the "Blue Ridge," or "Mountain," as it is called in the Niagara district, for twenty miles back to Eugenia Falls, affording some of the most picturesque scenery in Canada. The finest of plums are grown in this section, both in quality and beauty of appearance, and the yield of fruit is most remarkable in quantity.

Mr. C. W. Hartman very kindly engaged a carry-all, and, along with another gentleman, piloted us throughout this whole valley. Clarksburg is itself a small but prosperous town, founded many years ago by Mrs. Hartman's father, Mr. Marsh. It has waterworks, drawing its supply from the Beaver river, and shows other evidences of prosperity.

One of the most interesting fruit farms which were visited in this locality was that of Mr. John Mitchell, consisting of about 50 acres, of which fifteen are devoted to fruit. The whole place is in a most excellent state of cultivation. The thrifty farmer is known by his fences, and those of Mr. Mitchell are quite models in this respect. The particular fruit for profit with him, as with most growers in this valley, is the plum, and the success attending his efforts was well shown by the immense loads of Coe's Golden Drop, Lombard, Glass Seedling, etc., which were harvested from his trees.

Mr. Hartman showed the same success in his own orchard with plums, and not far away in the vicinity of Collingwood there are many other noted plum growers, and among them Dr. George M. Aylesworth, a well-known member of the Fruit Growers' Association, who ships a large quantity of this fruit both northward as far as North Bay by rail and Sault Ste. Marie by boat, and southward to Toronto and Montreal by express. Among all these growers a great deal of difficulty has been found in identifying varieties, owing to the frequent mistakes made by careless nurserymen in the propagation of trees, and to the frequent habit of substituting one variety for another when filling orders. Should a plum station be established in this vicinity all varieties will be grown and identified, and, little by little, all mis-named varieties grown in the section will be identified.

Mr. Mitchell's apple orchard was also worthy of attention. Here, as indeed all over this section, there is a good crop of apples, the best probably in the whole province, for the apple scab thus far has not become so prevalent in this northern section as it has in the southern districts. So successfully is the apple cultivated in this section that a large apple storehouse has been erected near Thornbury by Messrs. Ingersoll & Hunt, where apples are stored in barrels and repacked for export just at such times during the winter season when they will bring the most money. The double wainscotted walls are filled with sawdust, and both on the outside and inside of this double wall are air spaces. This house is cold in summer and sufficiently warm in winter to preserve the fruit from freezing without fire.

Some of the principal varieties of apples grown for market in this district are Ben Davis, Spy, King, Baldwin, Ribston Pippin, Fameuse, Cayuga Red Streak, St. Lawrence and Golden Sweet, but of all kinds the most productive is the Ben Davis. Some five-year-old trees of this variety in Mr. Mitchell's orchard are loaded to the very ground with fine, well-colored fruit, and this early and regular bearing seemed to be a marked characteristic of this variety.

Pears are not widely cultivated as yet in this section, but the Flemish Beauty, which is hardy, succeeds admirably. Some trees of this variety in Mr. Mitchell's orchard produced fruit which was remarkably fine. One tree in particular, which he showed, which was fifteen years planted, had produced four barrels of pears in the season of 1890, from which he had cleared \$15.55; and similar crops at other times have been harvested. The fruit of this season is of a fine size and well colored, a special feature being the absence of scab, which so destroys the Flemish Beauty in some sections.

The people of the Beaver Valley are alive to their own interests, and have vigorously enforced the black knot by-law during the past seven years; and this forethought has been worth thousands of dollars in this valley.

We may add that since our visit, the Board of Control has decided to appoint Mr. John Mitchell experimenter in plums and other fruit for the Georgian Bay District.

H. L. HUTT,
L. WOOLVERTON.

REPORTS FROM STATIONS.

In view of the lateness of the season when the work was got into operation, few results can be expected for publication in this our first annual report. But, since our experimenters are practical fruit growers and already engaged for a long time in the work of experimenting, more or less, with many varieties at their own expense, they are able to furnish us, even now, with some of the results that are worthy of publication, and in compliance with their agreement, they sent in to us about the 15th of November, 1894, the following reports of their summer's work, which, we believe, will embrace some matters of general interest and be of benefit to Ontario fruit growers.

Year by year the descriptive lists will be filled in and amended, until we hope to have every known variety of any consequence faithfully described and figured, and its history and true value carefully recorded.

Very little has been done in the way of records of station work during the past season, because it was too late to plan any special lines of experiment, but next year more complete reports under this head may be expected.

VARIETIES OF FRUITS NOW UNDER TEST AT STATIONS.

Varieties added in Spring of 1894 are indicated by an asterisk (*).

BAY OF QUINTE EXPERIMENT STATION.

Specialty—Apples and Pears. Experimenter—W. H. Dempsey, Trenton, Ont.

APPLES.

*Acker.	Haas.	Primate.
Adam's Pearmain.	Hardstine's Pippin	*Princess Louise.
Alexander.	Hawley.	Rambo.
American Golden Russet.	Hawthornden.	Rawles Janet.
*Annette.	Hawthornden New	Red Astrachan.
Antonovka.	Hawthornden's Pippin	Red Bietigheimer.
*Andrew's Sweet.	Highland Beauty.	Red Canada.
Arabka.	Horn.	Red Russet.
Arkansas Queen.	Holland Pippin.	Reinette Verte.
Arnold's Beauty.	Hubbardston Nonsuch.	Rhode Island Greening.
Bailey Sweet.	Hurlburt.	Ribston Pippin.
Baldwin.	Jersey Sweeting.	River's Winter Peach.
Beauty of Kent.	Jonathan.	*Rochelle.
Ben Davis.	Kentish Fill-basket.	Roxbury Russet.
Benoni.	Keswick Codling.	Saxton.
Belle Pool of Vermont.	Kinthead.	*Scott's Winter.
*Bishop Bourne.	Kinnaird's Choice.	Shannon.
Blenheim Pippin.	Lady.	Shiawassee Beauty.
*Blunt.	Lady Henniker.	Sops of Wine.
Bonum.	La Rue.	Stuart's Golden.
*Brockville Beauty.	*Longfield.	Stephen.
Cabaslea.	Lord Burrelgh.	St. Lawrence.
Canada Baldwin.	Lord Duncan.	Stump.
Cayuga Red Streak.	Lord Suffield.	Stark.
Cellini.	Maggie's Favorite	*Sutton Beauty.
Chenango Strawberry.	Magog Red Streak.	Swaar.
Colvert.	Maiden's Blush.	*Switzer.
Cox's Orange Pippin.	Mann.	Talman Sweet.
Cranberry Pippin.	Margil.	Tetof-sky.
Drap d'Or.	Mother.	Tompkin's King.
Duchess of Oldenburg.	Mountain Beet.	Treaton.
Ella.	Mountain Tulip.	Twenty Ounce.
Fallawater.	Munson Sweet.	Vandevere.
Fall Jenneting.	McIntosh Red.	Vermont Sweet.
Fall Pippin.	*McMahon.	Wagener.
Fameuse.	Newtown Pippin.	Wealthy.
*Gavel Pippin.	Norcaster Spy.	Westfield Seek-No-Further.
Golden Sweet.	Northern Spy.	Wellington.
Golden White.	Northfield Beauty.	Wine Sap.
Grand Duke Constantine.	*Northwest Greening.	*Winter St. Lawrence.
Grand Sultan.	Old Pearmain.	Wolf River.
Gravenstein.	Pewaukee.	Yellow Belleflower.
Green Fameuse.	Pomme Grise.	Yellow Transparent.
Grime's Golden.	Pomme Grise d'Or.	

PEARS.

Anjou.	Flemish Beauty.	Mount Vernon.
Bartlett.	General Todleben.	Onondaga.
Belle Lucrative.	Giffard.	Reeder.
Beurre Gris d'Hiver Noveau.	Hardy.	Seckel.
Beurre Oswego.	Howell.	Sheldon.
Boussock.	Idaho.	Souvenir de Congres.
Buffam.	Josephine.	Superfine.
Clairgeau.	Keiffer.	Tyson.
Clapp's Favorite.	Lawrence.	Urbaniste.
Duchess de Bordeaux.	Louise Bonne.	Vicar of Wakefield.

BLACKBERRIES.

*Kittatinny. *Snyder.

PLUMS.

*Burbank. *Willard.

RASPBERRIES.

- | | | |
|------------|----------------|-----------------|
| *Caroline. | *Golden Queen. | *Smith's Giant. |
| *Cuthbert. | *Marlboro. | *Turner. |

STRAWBERRIES.

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|------------------|------------------|--------------|
| *Auburn. | *Hatfield. | *Saunders. |
| *Bubach. | *Haverland. | *Selette. |
| Bubach 24. | *Lady Rusk. | *Shaw. |
| *Enhance. | *Little 24. | *Warfield. |
| *Eureka. | *Martha. | *Williams. |
| *Florence. | *Michel's Early. | *Wilson. |
| *Great American. | *Moore's Early. | *Woolverton. |
| *Great Pacific. | *Mrs. Cleveland. | |

SIMCOE EXPERIMENT STATION.

Specialty—Apples. Experimenter—G. C. Caston, Craighurst, Ont.

†APPLES.

† This list contains a large number of Russian varieties, kindly furnished by Mr. William Saunders, director of the Dominion Experimental Farms, free of cost to the Board.

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|--------------------|--------------------------|---------------------------------|
| Alexander. | *Karabovka 29 M. | *Reinette Grise No. 28. |
| *Anisim 18 M. | *Kara Synap (a) Niemetz. | *Rochelle. |
| *Annette. | *Kara Synap (b) Niemetz. | *Romenska (Gibb). |
| *Antonovka (Gibb). | King. | *Romna. |
| *Aport 252. | *Kluevskoe 457. | *Rosy Voronesh (1277) (Beadle). |
| *Arabka. | *Kourskains 984. | *Round Borsdoff. |
| *Arabka Summer. | *Large Anis 413. | *Royal Table. |
| *Arabka Winter. | *La Rue. | *Russian Transparent. |
| *Avondrius. | *Ledenetz (Gibb). | *Russian Tyrol 4. |
| *Basil the Great. | *Ledenetz 30 M. | Sacharine. |
| *Beautiful Arkad. | Little Hat. | *Sara Synap. |
| *Belle de Boskoop. | *Longfield. | *Scott's Winter. |
| Belleflower. | Longarcade. | *Shiawasee Beauty. |
| Blunt. | *Lubsk Queen. | *Silken Leaf. |
| Blushed Calville. | *Malone. | *Sibirsk No. 2. |
| *Bogdanoff. | Mann. | *Sibirsk No. 4. |
| Bode. | *McIntosh Red. | *Sibirsk No. 10. |
| *Borovinka. | *McMahon. | *Sibirsk No. 11 (4). |
| *Borsdoff No. 19. | *Northwest Greening. | Spitzenburg. |
| *Canada Baldwin. | *No. 569. | Spy. |
| *Charlamoff 262. | *No. 585. | *Stark. |
| *Crimean Bogg. | *Orel No. 1. | *Stetten No. 30. |
| Duchess. | *Orel No. 5. | Strawberry. |
| *Duchess Vor. | *Orel 980. | *Suislepp. |
| *Early Sweet. | *Orel Not. | *Sunbeam. |
| *Enormous. | *Ostrekoﬀ Glass (Fisk). | *Sutton Beauty. |
| *Fameuse. | *Ostrekoﬀ 472 (Beadle). | *Sweet Borovinka. |
| *Flat Voronesh. | *Pepka Aport 26. | *Sweet Bough. |
| *Forest. | *Pepka Winter. | *Switzer. |
| *Gipsy Girl. | *Persian Bogg. | *Taffot Winter Broskan. |
| *Golden Reinette. | Pewaukee. | *Titovka. |
| Golden Russet. | *Plodovidka. | *Talmán Sweet. |
| *Golden Stone. | *Princess Louise. | *Vargulek 55 Vor. |
| *Golden White. | *Rasperry. | *Voronesh Reinette (Beadle). |
| *Grandmother. | *Red Aport. | *Wallbridge. |
| *Green Fameuse. | Red Astrachan. | Wealthy. |
| Greening. | Red Bietigheimer. | *White Pigeon. |
| *Green Stripe. | *Red Queen. | *Winter St. Lawrence. |
| Haas. | *Red Reinette. | *Winter Rambour. 1 |
| *Hibernal. | *Red Streak. | *Wolf River. |
| *Herren (Gibb). | *Red Subluck No. 26. | *Yellow Transparent. |
| *Karabovka 21 M. | | |

PLUMS.

- | | | |
|-----------------|-----------------------|--------------------------|
| *Arch Duke. | Middleburg. | *Quackenbos. |
| *Black Diamond. | *Monarch. | *Rochester German Prune. |
| *Grand Duke. | *Peter's Gage. | *Shippers' Pride. |
| *Gueii. | *Prince of Wales. | *Stanton. |
| *H. R. P. Egg. | *Prince's Yellow Egg. | *Union Purple. |

CHERRIES.

*Bessarabian.
*Brussels Brown.
*Dyehouse.

*Griotte du Nord.
*Lestoyka.
*Ostheim.

*Orel 24.
*Vladimir.

CURRANTS.

Black Naples.
*Champion.
Fay's Prolific.

Lee's Prolific.
*North Star.
*Red Cherry.

*Saunders.
*Versailles.
White Grape.

BLACKBERRIES.

*Agawam.
*Gainor.

*Kittatinny.
*Minnewaski.

*Snyder.

GRAPES.

*Amber Queen.
*Aminia.
*Black Eagle.
Concord.
*Cottage.
*Early Victor.
*Eaton.
*Elvira.

*Green Mountain.
*Ives.
*Janesville.
*Jessica.
*Lindley.
*Marmion.
*Missouri Riesling.

Moore's Early.
*Moore's Diamond.
*Moyer.
Prentiss.
Salem.
Vergennes.
Worden.

GOOSEBERRIES.

*Downing.
*Houghton.

*Industry.
*Pearl.

*Red Jacket.
*Smith's Improved.

RASPBERRIES.

*Caroline.
*Cromwell.
Cuthbert.
Golden Queen.
Gregg.

*Kansas.
Lovett.
*Marlboro.
*Palmer.

Shaffer.
*Smith's Giant.
*Superlative.
*Turner.

STRAWBERRIES.

*Advocate.
Auburn.
*Beder Wood.
Belmont.
Bubach.
*Bubach No. 24.
*Cameronian.
*Captain Jack.
Crescent.
*Daisy.
*Edgar.
*Enhance.
*Eureka.
*Florence.
*General Putman.

*Governor Hoard.
*Great American.
*Great Pacific.
*Greenville.
*Hatfield.
Haverland.
Jessie.
*Lady Rusk.
*Leader.
*Little's No. 44.
*Lovett.
*Martha.
*Michel's Early.
*Middlefield.
*Moore's Early.

*Mrs. Cleveland.
*Parker Earle.
*Saunders.
*Sellette.
*Seneca Queen.
*Shaw.
*Southard.
*Swindle.
*Timbrell.
*Warfield.
Williams.
Wilson.
*Woodruff.
*Woolverton.

WENTWORTH EXPERIMENT STATION.

Specialty—Grapes. Experimenter—M. Pettit, Winona, Ont.

CHERRIES.

*Bessarabia.
*Black Heart.
*Black Tartarian.
*Buttner's Yellow.
*Early Purple.

*Early Richmond.
*Governor Wood.
*May Duke.
*Montmorency Ordinaire.
*Napoleon Bigarreau.

*Ostheim.
*Reine Hortense.
*Vladimir.
*Windsor.
*Yellow Spanish.

GRAPES.

Adirondac.	* Esther.	Moyer.
Agawan.	* Etta.	Niagara.
Alvah.	Eumelen.	Noah.
Amber.	Eva.	Northern Muscadine.
Amber Queen.	* F. B. Hayes.	Norton's Virginia.
Aminia.	Florence.	Oneida.
* Arnold.	* Geneva.	Oriental.
August Giant.	Goethe.	Pearl.
* Bacchus.	* Green Mountain.	Perkins.
Barry.	* Grein's Golden.	Pocklington.
Black Delaware	Hartford Prolific.	Prentiss.
Black Eagle.	Herbert.	Rebecca.
Black Pearl.	Herman.	Rentz.
Brighton.	Highland.	Requa.
Canada.	Iona.	* Rockwood.
Catawba.	Isabella.	Rogers 7.
Centennial.	Ives.	Rogers 13.
Champion.	Jamesville.	* Rogers 28.
Clinton.	Jefferson.	Rogers 30.
Concord.	Jessica.	Rogers 32.
* Concord Chasselas.	Lady.	Rogers 34.
* Concord Muscadine.	Lady Washington.	Salem.
Cottage.	Lindley.	Senasqua.
Creveling.	* Marion.	Taylor.
* Croton.	Martha.	* Transparent.
* Cynthiana.	Massisoi.	Triumph.
Delaware.	* Maxatawney.	* Ulster.
Diana.	Merriam.	Ulster Prolific.
Dracut Amber.	Merrimac.	Vergennes.
Duchess.	* Mills.	* Victoria.
Early Dawn.	* Missouri Riesling	* Walter.
Early Victor.	Monroe.	White Ann Arbor.
Eaton.	* Montefiore.	Wilder.
Eldorado.	* Montgomery.	* Woodruff Red.
Elvira.	Moore's Diamond.	Worden.
Empire State.	Moore's Early.	Wyoming Red.
Essex.		

BLACKBERRIES.

Kitattinny.

Snyder.

CURRANTS.

* Black Naples.	* Lee's Prolific.	* Saunders.
* Champion.	* North Star.	* Versailles.
* Fay's Prolific.	* Red Cherry.	* White Grape.

GOOSEBERRIES.

* Downing.	* Industry.	* Smith's Improved.
* Houghton.	* Pearl.	

PEACHES.

* Alexander.	* Foster.	* Mountain Rose.
* Bowslough or Longhurst.	* Killborn.	* Old Mixon.
* Carlisle.	* Honest John.	* Pratt.
* Crosby.	* Hyne's Surprise.	* Smith's Late.
* Early Canada.	* Jersey Pride.	* Smock.
* Early Rivers.	* Late Crawford.	* Stephen's Rareripe.
* Early Richmond.	* Michigan No. 1.	* Wager.
* Early St. John.	* Michigan No. 2.	* Willetts.
* Elberta.	* Michigan No. 3.	* Yellow Rareripe.

PEARS.

Anjou.	Clapp's Favorite.	Kieffer.
Bartlett.	Duchess.	Leconte.
Beurre Giffard.	Flemish Beauty.	Sheldon.

PLUMS.

* Arch Duke.	* Gueii.	* Quackenbos.
* Black Diamond.	* H. R. P. Egg.	Reine Claude.
Bradshaw.	Lombard.	* Rochester German Prune.
Coe's Golden Syrup.	* Monarch.	* Shipper's Pride.
Duane's Purple.	* Peter's Gage.	* Stanton.
General Hand.	Pond's Seedling.	* Union Purple.
German Prune.	* Prince of Wales.	Washington.
* Grand Duke.	* Prince's Yellow Egg.	Yellow Egg.

RASPBERRIES.

* Caroline.	* Golden Queen.	* Superlative.
* Cuthbert.	* Marlboro.	* Turner.

STRAWBERRIES.

* Auburn.	Haverland.	* Selette.
* Bubach.	* Lady Rusk.	* Saunders.
* Bubach 24.	* Little's 44.	* Shaw.
* Enhance.	* Martha.	Warfield.
* Eureka.	* Michel's Early.	Williams.
* Great American.	* Moore's Early.	Wilson.
* Great Pacific.	* Mrs. Cleveland.	Woolverton.
Hatfield.		

SOUTHWESTERN EXPERIMENT STATION.

Specialties—Peaches and Strawberries. Experimenter—W. W. Hillborn, Leamington, Ont.

PEACHES.

Alexander.	Ellison.	McCollister.
Allen.	Engol's Mammoth.	New Prolific.
Barnard Early.	Fitzgerald.	Old Mixon.
Barnard Late.	Foster.	Richmond Late.
Boyle's Yellow.	Fox's Seedling.	Salway.
Brandywine.	Frankford.	Shipley.
Brigden.	Globe.	Smock.
Brunson.	Golden Drop.	Smock Beers.
Chair's Choice.	Hale's Early.	Snow's Orange.
Champion.	Hill's Chili.	Southwick.
Cleffey's Allen.	Hinman.	Stephen's Rareripe.
Corner.	Hortense Rivers.	Stump.
Crane's Yellow.	Jacques Rareripe.	St. John.
Crawford Early.	* Jersey Pride.	Switzerland.
Crawford Late.	La Fleur.	Susquehanna.
Crosby.	Lemon Free.	Tyhurst Seedling.
Diamond.	Lewis' Seedling.	Wager.
Dumont.	Longhurst.	Wheatland.
Early Canada.	Marshall's Late.	Wilder.
Early River.	Moore's Favorite.	Wonderful.
Early Toledo.	Mountain Rose.	Yellow Rareripe.
Elberta.		

CHERRIES.

Belle Magnifique.	Governor Wood.	Reine Hortense.
Black Tartarian.	Great Bigarreau.	Rockport.
Early Richmond.	May Duke.	Windsor.
Empress Eugenie.	Ostheim.	Wragg.

CURRANTS.

Black Champion.	Lee's Prolific.	Raby Castle.
Cherry.	* North Star.	Seedling (New).
Fay's.	Prince Albert.	White Grape.

GOOSEBERRIES.

Downing.	Smith's Improved.	Whitesmith.
Industry.		

STRAWBERRIES.

Barton's Eclipse.	Hatfield.	Parker Earle.
Beder Wood.	Haverland.	Pearl.
*Beverly.	*Henry Ward Beecher.	*Phillip's Seedling.
Bubach.	*Iowa Beauty.	Sadie.
Cameronian.	Jessica.	Saunders.
Captain Jack.	*Jucunda Imperial.	Seneca Queen.
Cloud.	*Kentucky.	*Shuckless.
Crawford.	Lady Rusk.	*Shuster's Gem.
Crescent.	Leader.	*Smith's Seedling.
Cumberland.	• Lovett.	*Southard.
Daisy.	Manchester.	Swindle.
Edgar Queen.	*Martha.	Timbrell.
*E. P. Roe.	*Mary.	*VanDeman.
Eureka.	*Maxwell.	*Victor Hugo.
Farnsworth.	*Meek's Early.	Walton.
Felton.	*Michel's Early.	*White Novelty.
Florence.	Middlefield.	Williams.
Gandy.	Mitchell's Early.	Wilson.
General Putman.	Mrs. Cleveland.	Woodruff.
Governor Hoard.	Mt. Holyoke.	Woolverton.
Great Prolific.	*Omega.	Yale.
*Greenville.	Osceola.	

RASPBERRIES.

Brandywine.	Heebner.	Shaffer's Colossal.
Cuthbert.	Hilborn.	*Superlative.
Golden Queen.	Kansas.	Tyler.
Gregg.	Marlboro'.	

MAPLEHURST FRUIT FARM.

(The Private Experimental Grounds of the Secretary, situated at Grimsby, Ont.)

APPLES.

Alexander.	Gibb Crab.	Red Astrachan.
American Golden Russett.	Gloria Mundi.	Red Bietigheimer.
Baldwin.	Golden Russet.	Red Russet.
Beauty of Kent.	Golden Russet (English).	Reynard.
Ben Davis.	Golden White.	Rhode Island Greening.
Blenheim Pippin.	Gravenstein.	Ribston Pippin.
Blue Pearmain.	Grimes Golden.	Roxbury Russet.
Brodie's Seedling.	Haas.	Sara Synap.
Cabasha.	Hibernal.	Shiawassee Beauty.
Canada Baldwin.	Holland Pippin.	Snow.
Canada Red.	Hubbardston's Nonsuch.	St. Lawrence.
Cayuga Red Streak.	Kean's Seedling.	Stone Antonovka.
Colvert.	Keswick Codlin.	Swaar.
Cranberry Pippin.	King of Tompkins Co.	Swazie Pomme Grise.
Crystal White.	La Rue.	Talman Sweet.
Detroit Black.	Longfield.	Tetofsky.
Duchess of Oldenburg.	Mann.	Titovka.
Early Harvest.	Maiden's Blush.	Twenty Ounce Pippin.
Early Strawberry.	McIntosh Red.	Vandevere.
Esopus Spitzenburg.	Newtown Spitzenburg.	Wagner.
Faliawater.	Northern Spy.	Wallbridge.
Fall Pippin.	Porter.	Wealthy.
Fall Queen.	Princess Louise.	Yellow Anis.
Fameuse.	Rambo.	Yellow Belleflower.
Fameuse Sucre.	Red Anis.	Yellow Transparent.
Flushing Spitzenburg.		

APRICOTS.

Russian.

BLACKBERRIES.

Early Harvest.	Mammoth Cluster.	Souhegan.
Erie.	Snyder.	Stone's Hardy.
Kittatinny.		

CHERRIES.

American Amber.
Belle de Choisy.
Belle Magnifique.
Black Eagle.
Black Tartarian.
Buttner Yellow.
Dyehouse.
Early Purple.
Early Purple Guigne.
Early Richmond.

Elkhorn.
Elton.
English Morello.
Governor Wood.
Knight's Early Black.
Late Duke.
Late Kentish.
Leib.
Louie Phillip.
May Duke.

Montmorency.
Montmorency Ordinaire.
Napoleon Bigarreau.
Reine Hortense.
Rockport Bigarreau.
Starr's Prolific.
Vladimir.
Windsor.
Wragg.
Yellow Spanish.

CURRANTS.

Black Naples.
Cherry.
Fay's Prolific.

Greenfield Red.
Lee's Prolific.

Versailles.
Victoria.

DEWBERRIES.

Lucretia.

GOOSEBERRIES.

*Carnie.
Conn.
Crosby's Seedling.
Downing.

Industry.
Ottawa.
Pearl.

Smith's Improved.
Sutherland's Seedling
Whitesmith.

GRAPES.

Adirondac.
Agawam.
Allan's Hybrid.
Amber.
Aminia.
Amber Queen.
August Giant.
Autuchon.
Bacchus.
Barry.
Black Eagle.
Black Pearl.
Brant.
Brighton.
Burnet.
Canada.
Catawba.
Champion.
Concord.
Concord Muscat.
Cornucopia.
Cottage.
Creveling.
Croton.
Delaware.
Diana.
Dracut Amber.
Duchess.
Early Victor.
Eldorado.

Empire State.
Etta.
Eumelen.
Faith.
F. B. Hayes.
Goethe.
Hartford.
Iona.
Israella.
Ives.
Janesville.
Jefferson.
Jessica.
Lady.
Lady Washington.
Lindley.
Marmion.
Martha.
Mary.
Massasoit.
Merrimac.
Mills.
Missouri Riesling.
Moore's Diamond.
Montefiore.
Naomi.
Niagara.
Noah.
Norfolk.
Northern Muscadine.

Norton.
Oneida.
Oriental.
Othello.
Pearl.
Perkins.
Pocklington.
Poughkeepsie.
Prentiss.
Rebecca.
Rogers 3.
Rogers 9 (Salem).
Rogers 11.
Rogers 15.
Rogers 19.
Rogers 28.
Rogers 30.
Rogers 32.
Rogers 43.
Rogers 44.
Telegraph.
To Kalon.
Transparent.
Ulster Prolific.
Vergennes.
Victoria.
Wilder.
Woodruff Red.
Worden.
Wyoming Red.

PEACHES.

Alexander.
Beatrice.
Bowslaugh Late.
Centennial.
Cooledge's Favorite.
Conkling.
Christiana.
Crawford.
Early Canada.
Early Crawford.
Early Richmond.
Early Rivers.
Elate.
Elberta.

Foster.
Hale's Early.
Hillborn.
Hill's Chili.
Honest John.
Lemon Cling.
Louise.
Lord Palmerston.
May's Choice.
Michigan.
Mountain Rose.
Old Mixon.
Pineapple.
Richmond.

Salway.
Schumacker.
Scott's Seedling.
Smith's Improved.
Smock.
Steven's Rareripe.
Troth's Early.
Wager.
Waterloo.
Wheatland.
Willets.
Wonderful.
Yellow St. John.

PEARS.

Ananas d'Ete.	Doyenne Grey.	Onondaga.
Bartlett.	Doyenne d'Ete.	Osband's Summer.
Belle Lucrative.	Doyenne White.	Petite Marguerite.
Beurre Assumption.	Duchess d'Angouleme.	Prest. Drumard.
Beurre Bosc.	Flemish Beauty.	Princess.
Beurre Brown.	Frederick Clapp.	Reeder.
Beurre d'Anjou.	Goodale.	Rostiezer.
Beurre Diel.	Glout Morceau.	Sapieganga.
Beurre Giffard.	Howell.	Sheldon.
Beurre Easter.	Josephine de Malines.	Seckel.
Beurre Hardy.	Kieffer.	Souvenir de Congress.
Beurre Livonia.	Kirkland.	St. Lawrence.
Beurre Superfin.	Kooschtsinska.	Summer Belle.
Brandywine.	Lawrence.	Swan's Orange.
Buffum Chambers.	Leconte.	Triumphe de Vienne.
Clapp's Favorite.	Louise Bonne.	Tyson.
Clairgeau.	Madeline.	Urbaniste.
Dana's Hovey.	Manning's Elizabeth.	Vicar.
Dearborn.	Medviedka.	Victoria.
Doyenne.	Mount Vernon.	Winter Nelis.
Doyenne Boussock.		

PLUMS.

Abundance.	General Hand.	Pond's Seedling.
*Arch Duke.	German Prune.	*Prince of Wales.
Baker German Prune.	Glass Seedling.	*Prince's Yellow Gage.
Bassett's American.	*Grand Duke.	Prunus Simoni.
Black Diamond.	Green Gage.	Purple Egg.
Bradshaw.	*H. R. Purple Egg.	Quackenbos.
*Burbank.	Imperial Gage.	Reine Claude de Bavay.
Caraduc.	Jefferson.	Rochester German Prune.
Coe's Late Red.	Lombard.	*Shipper's Pride.
*Czar.	Middleburg.	Shropshire Damson.
Damson.	Moore's Arctic.	Stanton.
Duane's Purple.	Monarch.	*Union Purple.
Field.	Niagara.	Weaver.
French Prune.	Peter's Gage.	Yellow Egg.

QUINCES.

Orange.	Champion.	Angers.
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RASPBERRIES.

Brinckle's Orange.	Gregg.	Shaffer's Colossal.
Cuthbert.	Golden Queen.	*Superlative.
Caroline.	Marlboro'.	Turner.
Diadem.	*Sarah.	

STRAWBERRIES.

Auburn.	Glendale.	Moore's Early.
Belmont.	Gold.	Mrs. Cleveland.
Bessie.	Great American.	Mrs. Garfield.
Big Bob.	Great Pacific.	Mt. Holyoke.
Boynnton.	Haverland.	Old Ironclad.
Bubach.	Hatfield.	Ohio.
Bubach 24.	Henderson.	Ontario.
Burt.	Itasca.	Parry.
Captain Jack.	Jessie.	Pineapple.
*Caughell's No. 2.	Jewell.	Saltelle.
Chamberlain.	Lady Rusk.	Saunders.
Cloud.	Laxton's Noble.	Seneca Queen.
Covil.	Lida.	Sharpless.
Cumberland Triumph.	Little's 10.	Shaw.
Downing.	Little's 44.	Stayman.
Early Canada.	Logan.	Sucker State.
Enhance.	Louden's 15.	Summit.
Eureka.	Manchester.	Warfield.
Finch Prolific.	Mary Fletcher.	Williams.
Florence.	May King.	Wilson.
Gandy's Prize.	Michel's Early.	Woolverton.
Gillespie.	Monarch.	Wood.

REPORT OF BAY OF QUINTE EXPERIMENT STATION.—W. H. DEMISEY, TRENTON, EXPERIMENTER.
 APPLES.—DESCRIPTIVE LIST.

Number.	Variety.	Origin.	Tree.				Fruit.				
			Habit.	Foliage.	Vigor, scale 1-10.	Hardness, scale 1-10.	Productiveness, scale 1-10.	Age of bearing.	Size.	Form.	Color of skin.
1	Albany	Albany, Prince Edward	S	wide	8	10	6	8	L	round, ovate	yellow.
2	Alexander	Russia, in England by J. M. Lee, 1817.	S	large, wide, glossy.	10	10	8	6	L	round, ovate, conical.	greenish-yellow, russet dots, streaked with red or splashed.
3	Benoni	Dedham, Mass.	U S	medium	8	10	8	10	M	oblate, conical.	rich yellow, blushed with red in sun.
4	Ben Davis	America	S	large	6	7	8	10	L	roundish, ovate.	yellow striped and splashed with red.
5	Baldwin	Massachusetts	S	large	6	7	8	10	L	roundish, ovate.	yellow shaded, splashed with crimson and red.
6	Beauty of Kent.	England	S	large	10	10	8	8	L	roundish, ovate.	yellow tinged with green shaded with red.
7	Bailey Sweet	New York State.	S	medium	6	8	8	6	L	roundish, conical	yellow shaded with red, russet dots.
8	Blenheim Pippin	Woodstock, Oxfordshire, England.	U S	large, heavy	10	10	10	10	L	round, oblate	orange-yellow streaked and splashed with red, large russet dots.
9	Cabasha	Quebec	U S	large, heavy	10	10	5	10	L	round, oblate	yellow striped and splashed with dull red.
10	Canada Baldwin	Quebec	S	curled	8	9	10	8	M	ovate	yellow broken strips and splashes of red, many russet dots.
11	Duchess	Russia	S	large, heavy	10	10	10	5	L	round, oblate	yellow splashed with light red in sun.
12	Fallowater	Pennsylvania	S	medium, light, green.	10	10	5	10	L	round, ovate	greenish-yellow shaded with a dull red and few large whitish dots.
13	Fameuse	Canada	S	medium, light, green.	8	8	10	6	M	round, oblate	yellow tinged with pale red and dark red in sun.
14	Fall Queen (Haas)	Kentucky	U S	large, good	8	8	8	6	M	oblate, conical.	yellow striped with crimson, covered with white dots.
15	Grand Sultan	Russia, in England by Mr. John Cott, 1864.	U	large, heavy	10	10	8	6	L	ovate	whitish-yellow striped and splashed with red in sun.
16	Hawthornden (old)	Edinburgh, Scotland	S	small	7	8	8	6	M	round, ovate	yellow with a crimson blush in sun.
17	Hawthornden (new)	Connecticut	S	large, glossy	8	8	8	6	L	round, ovate	yellow striped and splashed with red in sun,
18	Hurlbut	England	S	medium	7	9	7	8	L	round, oblate.	numerous small russet dots.
19	Lord Suffield	France	S	medium	6	8	9	8	M	conical, ovate.	pale greenish-yellow, slightly tinged with red in sun.
20	Margil	New York State	D	small, light	6	7	9	5	S	ovate	orange streaked with deep red and nearly covered on one side with russet.
21	Northern Spy	Massachusetts	U	large, glossy	10	8	10	14	L	roundish, conical	yellow striped and splashed with red in sun.
22	Mother	Massachusetts	U	medium	5	7	7	7	M	oblong, ovate, ribbed.	yellow covered with a rich red, a deep red in sun.
23	Ontario	Glas. Arnold, Paris, Ont. (Spy and Wagener).	U	large, good	8	9	10	5	L	oblate	yellow splashed and sprinkled with red or crimson in sun, covered with a rich bloom.

REPORT OF BAY OF QUINTE EXPERIMENT STATION.—Concluded.

APPLES.—DESCRIPTIVE LIST.

Fruit.

Number.	Cavity.	Stem.	Basin.	Calyx.	Core.	Flesh.			Season. (Months of use.)	Quality, scale 1-10.		Value, scale 1-10.	
						Color.	Texture.	Flavor.		Dessert.	Cooking.	Home market.	Foreign market.
1	D	3/4 inch	broad	partly open	ovate	white	buttery	sub-acid	Aug.—Sept.	6	4	4	....
2	D	1	deep, even	large open	large, oblate	yellowish white	crisp	sub-acid	Aug.—Oct.	4	9	9	....
3	D	1/2	small	erect, partly closed	oblate, conical.	yellow	tender	rich sub-acid	July—Sept.	10	8	4	7
4	D	1 to 1 1/2	deep	erect, partly closed	.....	white	tender	mild sub-acid.	Mar.—May	4	6	6	8
5	B	3/4 heavy	deep, plaited	closed	.....	yellowish white.	tender	sub-acid	Jan.—Mar.	4	6	8	8
6	D	1/2	narrow	small, closed	large, oblate	greenish white	tender	sub-acid	Oct.—Nov.	4	6	8	8
7	N	1/2	narrow	closed	oblate	yellowish white.	tender	sweet	Nov.—Mar.	4	8	4	4
8	B	1/2	broad	open	ovate, medium.	yellow	breaking	sub-acid	Nov.—Mar.	6	7	9	9
9	N	1	broad	open	oblate	whitish yellow	crisp	sub-acid	Dec.—Feb.	2	6	6	6
10	N	1 1/4	broad	closed	oblate	whitish yellow	crisp	mild sub-acid.	Dec.—Mar.	6	8	8	8
11	D	1/2	deep	partly closed	ovate	white	crisp	sub-acid	Aug.—Sept.	6	9	10	9
12	N	1/2	small	open	ovate	greenish white	crisp	mild sub-acid.	Jan.—Mar.	6	8	10	8
13	D	1/2	shallow	small, half open.	ovate	white	tender, juicy.	sub-acid	Sept.—Dec.	10	8	10	8
14	D	1/2	large	half open.	ovate	yellowish white	tender	acid	Sept.—Nov.	5	6	6	6
15	D	1/2	wrinkled	open	oblate	white	buttery	acid	Aug.—Sept.	5	8	6	6
16	D	1/2	wide	open	ovate	white	crisp	acid	Sept.—Nov.	5	7	5	7
17	B	1/2	broad	half open	small, ovate	white	crisp	acid	Oct.—Dec.	7	7	8	8
18	D	1/2	broad, plaited	closed	small, ovate	white	breaking	mild sub acid	Dec.—Feb.	8	8	8	8
19	D	1/2	broad, plaited	small, closed	ovate	white	tender.	sub-acid	Aug.—Sept.	4	7	5	5
20	D	1/2	angular	closed	ovate.	yellow	breaking	spicy, mild sub-acid.	Nov.—Jan.	10	8	9	9
21	D	1/2	deep	partly closed	large, ovate	yellowish white.	breaking	rich sub-acid	Jan.—Mar.	9	9	9	9
22	S	1/2	small, plaited.	closed	ovate.	yellow	breaking	spicy, mild sub-acid.	Nov.—Jan.	10	8	7	7
23	D	1/2	deep, even.	closed	medium, ovate.	white	breaking	sub-acid	Jan.—Mar.	9	9	9	9

Origin : Originator, place, date, parentage.
 Foliage : Subject to diseases, size, glossiness, quantity.
 Size : S, Small, less than 1 1/2 inches in diameter ; M, Medium, 1 1/2 to 3 1/2 inches in diameter ; L, Large, over 3 1/2 inches in diameter.
 Habit : S, Spreading ; U, Upright ; D, Drooping.
 Cavity : S, Shallow ; N, Narrow ; D, Deep ; B, Broad.
 Stem : Length ; tenacity to tree.
 Core : Shape and size of segments.
 Flavor : Shape and size of segments.

REPORT OF BAY OF QUINTE EXPERIMENT STATION.

PEARS.—DESCRIPTIVE LIST.

Number.	Variety.	Origin.	Tree.					Fruit.			
			Habit.	Foliage.	Vigor, scale 1-10.	Hardness, scale 1-10.	Productiveness, scale 1-10.	Age of bearing in years.	Size.	Form.	Color of skin.
1	Annanas d' Ete.....	Holland	U	medium light green	8	6	4	10	2½x2	obtuse pyriform	yellowish-green with a brownish tinge on side next to sun.
2	Bartlett, named after F. Bartlett, near Boston	England, originated about 1770 by Mr. Weeler, Alderminster, Berwickshire	U	narrow folded..	8	6	9	6	3x2½	oblong, obtuse pyriform	clear yellow, sometimes a little blush in sun, lemon yellow, sometimes green.
3	Belle Lucrative.....	Belgium.....	U	medium	8	8	8	8	2½x2	oblong, obtuse pyriform	yellow, or yellowish-brown.
4	Beurre Clairgeau	Nantes, in Rue de Basselle, by Mr. Clairgeau	U	heavy	8	6	8	10	3x2½	ovate pyriform.	greenish-yellow with a brown cheek next to sun covered with small russet dots.
5	Beurre d' Anjou.....	France.....	S	waved, curled, light green	10	10	6	10	3x2½	obtuse pyriform.	greenish-yellow with a brown cheek next to sun covered with small russet dots.
6	Beurre Gris d' Hiver.....	France	U	curled, large..	10	10	8	10	2½x2½	obovate	yellow, covered with thin brown russet.
7	Beurre Hardy.....	France	U	good, large, heavy	10	10	10	6	3x2½	obovate, obtuse pyriform	yellow, with a brown cheek.
8	Buffum	Rhode Island.....	U	large, good.....	10	10	10	8	2½x2	oblong, obovate	lemon yellow, sprinkled with russet dots.
9	Boussock	Belgium.....	US	very heavy, thick	10	10	10	8	3½x3	obovate	yellow, shaded with red.
10	Clapp's Favorite.....	Seedling raised by Thaddeus Clapp, Dorchester, Mass.	US	medium	10	8	10	6	3x3	pyriform	yellow, with russet dots on patches of russet or brown.
11	General Totleben.....	Belgium, Mr. M. Fontaine, Ghelng, 1855. .	US	curled.....	8	9	8	10	4x3	obovate, obtuse pyriform	green, turning yellow, with a little flush of red next to sun, large russet dots.
12	Josephine de Malines..	Raised by Major Esperen, of Malines, in 1830, and named in compliment of his wife ..	SD	small, curled... ..	8	9	9	8	2½x3	roundish oblate	

REPORT OF BAY OF QUINTE EXPERIMENT STATION.—Concluded.

PEARS.—DESCRIPTIVE LIST.

Fruit.

Number.	Cavity.	Stem.	Basin.	Calyx.	Core.	Flesh.			Season. (Month of use as Dec. March)	Quality, scale 1-10.		Value scale 1-10. Home market.
						Color.	Texture.	Flavor.		Dessert.	Cooking.	
1	S	1½, stout	shallow	partly open	ovate	white	buttery	sweet, stringent	Aug.—Sept.	4	4	5
2	S	1, stout	very shallow	open	ovate	white	buttery, melting	musky aroma, sub-acid	September	9	9	10
3	S	1½, stout	shallow	open	ovate	white	tender, very juicy	sweet	Sept.—Oct.	8	8	8
4	S	1, stout	shallow	open	obtuse	white	granular	poor	Nov.—Dec.	4	6	8
5	S	1, stout	shallow	open	obtuse	white	buttery, melting	sub-acid	Nov.—Jan.	8	8	10
6	S	1, stout	small	large, open	ovate	white	granular	sub-acid	March	4	4	4
7	S	1, stout	small, uneven	open	obtuse	white	buttery, melting	sub-acid	Sept.—Oct.	8	8	9
8	S	1, stout	small	half open	ovate	greenish white	buttery	sweet	October	4	4	4
9	S	1, stout	shallow, even	open	ovate	white	melting, juicy	sub-acid	Sept.—Oct.	8	9	9
10	S	1, stout	small, wrinkled	partly closed	ovate	white	juicy, melting	sub-acid	Aug.—Sept.	8	8	9
11	S	1, stout	wide, furrowed	open	small, ovate	rosy tinge	melting, juicy, slightly granulated	mild, sub-acid	Nov.—Dec.	10	8	8
12	N	1, stout	shallow	open	small, ovate	rosy tinge	melting, juicy	sugary, with a rich aroma	Dec.—Mar.	10	8	8

Origin: Originator, place, date, parentage.
Polioage: Subject to diseases, size, glossiness, quantity.
Stem: S, Small, less than 1½ inches in diameter; M, Medium, 1½ to 2 inches in diameter; N, Narrow; D, Deep; B, Broad.
Habit: S, Spreading; U, Upright; D, Drooping.
Cavity: S, Shallow; N, Narrow; D, Deep; B, Broad.
Stem: Length; tenacity to tree.
Core: Shape and size of segments, average length and breadth in inches.

BAY OF QUINTE STATION. RECORD OF EXPERIMENTS 1894.

APPLES.

Variety.	Origin.	When planted.	Date of pruning.	Thinning—per cent., by hand or acci- dent.	Date of gathering.	Yield.	Grade.			Average price per bbl.
							Class 1.	Class 2.	Class 3.	
*Albury	Albury, Ont.	1888	March	Bush.	Sept	1 bush .	$\frac{7}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	\$ c.
*Alexander.....	Russian	1878	"	"	"	4 bush .	$\frac{3}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	2 00
Benoni	Massachusetts ..	1880	"	"	"	4½ bush.	$\frac{3}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	"
Ben Davis.....	"	1880	April ..	1	Oct 16.	5 bbls .	4	1	"	"
Baldwin	"	1874	"	"	" 16.	3 bbls .	2½	$\frac{1}{2}$	"	"
Duchess	Russia	1890	March ..	1½	Aug. 18-25	3 bbls .	3	"	"	1 75
Fallowater	"	1878	"	2½	Sept. 1	1 bush .	$\frac{4}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	"
Fameuse	Canada	1890	April ..	1	" 8.	5½ bbls .	5	$\frac{1}{5}$	$\frac{1}{5}$	2 50
Northern Spy ..	"	1890	"	"	" 9.	4 bbls .	3	1	"	"
†Ontario	Chas. Arnold, Paris, Ont., Spy X Wagener.	1890	"	"	" 9.	1 bbl. .	1	"	"	"

*Dwarf trees. †Bailey Sweet, grafted to Ontario four years ago.

The soil was a sandy loam, cultivated and fertilized with stable manure. The pruning was pyramidal. Apples were stored in cellar.

NOTES ON VARIETIES.

Apples.

I see many different opinions of the same apple, given in different districts. A great deal is said in favor of the *Canada Baldwin*; am sorry it does not succeed with me, subject to spot; more so than the *Snow*; it has been fruiting seven years and has been only clean one year. It is of fine flavor, productive and attractive, when clean.

Winter St. Lawrence will be a profitable apple. It is larger than the fall *St. Lawrence* and of nearly the same appearance and flavor, but not so subject to crack and spot; hardy and a good grower.

Mountain Beet and *Mountain Tulip* are more subject to spot than any other varieties yet fruiting.

La Rue seems to be nearly as late coming into bearing as *Spy*. It is a very upright grower, but the fruit was not desirable last year. It may improve as it gets age, or is grown on different soil.

Hubbardston None-such is a very profitable apple; more so than any other variety on light gravelly soil. It keeps through January and February.

Pewaukee is a large fine apple more productive than the *King* and as good. It requires rich soil; the fruit is subject to drop prematurely, the same as *Fallowater*.

Ontario is one of the most profitable apples we have. The tree is hardy, but bears too heavily to make much growth. My *Ontario* apples sold equal to *Spys* in *Montreal*.

Primate is a very desirable early apple for a small orchard on account of its unevenness in ripening, commencing to ripen with *Red Astrachan* and lasting through October. It is an excellent cooker and dessert apple; also *Seacliff's Hawthornden*, which can be grown in the same space as a currant bush. The fruit is large, round, lemon-colored, of good flavor and a good cooker.

Pears.

One of the most profitable pears grown here is Doyenne Boussock. It is not so early a bearer as Bartlett, but a more healthy tree and not so subject to blight. I have only seen one tree blighted yet. It ripens after Bartlett.

Mount Vernon is also healthy and productive. The fruit requires to be handled with great care to get it into market in good condition; a slight bruise will cause it to spoil in a short time.

Anjou is one of the finest winter pears. The tree is healthy but a shy bearer. I consider *Josephine* and *Lawrence* the most profitable of winter pears tested here, both heavy croppers and of fine flavor, but they are not so attractive in the market as Anjou.

Urbaniste is slow in coming into bearing, but is a very fine pear.

OUTLINES OF APPLES AND PEARS.

The outlines show the exact size, from samples grown at Bay of Quinte Fruit Experiment Station, Trenton, Ont.

ALBURY. (Fig. 1.) One of the oldest apples grown along the shores of Bay of Quinte where it originated with one of the first settlers; not profitable compared with Duchess, ripens at the same time.

ARABKA. (Fig. 2.) Top-grafted in 1892, bore three apples this year, quality not very good, may improve as tree gets age.

GRAND SULTAN. (Fig. 3.) Very productive, uneven in size, not so profitable as Duchess, ripens at same time.

HAWTHORNDEN (NEW). (Fig. 4.) Large fine apple, very productive, of better quality than Colvert and ripens about the same time or a little later.

HAWTHORNDEN (OLD). (Fig. 5.) Very productive, good culinary apple.

HURLBUT. (Fig. 6.) Very even in size, productive, of good quality and attractive, worthy of testing.

WINTER ST. LAWRENCE. (Fig. 7.) Similar to fall St. Lawrence in color and flavor, but not of the same form. Not so subject to spot and crack, worthy of further testing.

NORCASTER SPY. (Fig. 8.) A very attractive dessert apple of medium size, very productive, too tender for shipping.

NORTHFIELD BEAUTY. (Fig. 9.) One of the most attractive autumn apples I have, ripens in September, keeps firm through October, of fine quality and productive.

BEURRE GRIS D'HIVER. (Fig. 10.) Productive winter pear of good quality.

LAWRENCE. (Fig. 11.) One of the best winter dessert pears, free from blight and productive.

MOUNT VERNON. (Fig. 12.) Very productive, annual bearer, but does not carry to market good; will decay when perfectly hard and firm.

SWAN'S ORANGE. (Fig. 13.) A profitable autumn pear in years gone by, but I have others that are better in quality of the same season.

GENERAL TODLEBEN. (Fig. 14.) Large, fine, of excellent quality, fully equal to Malines; little later in coming into bearing.

W. H. DEMPSEY, Experimentor.

TRENTON, Ont.

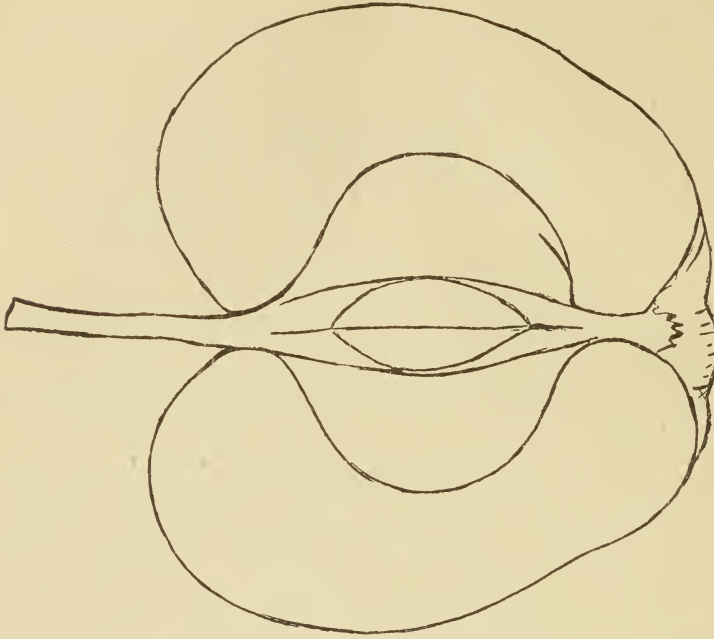


FIG. 2. APPLE—ARAKA.

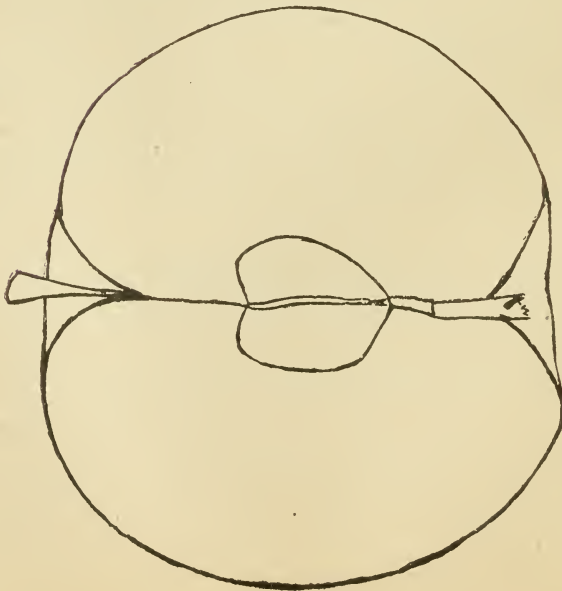


FIG. 1. APPLE—ALBURY.

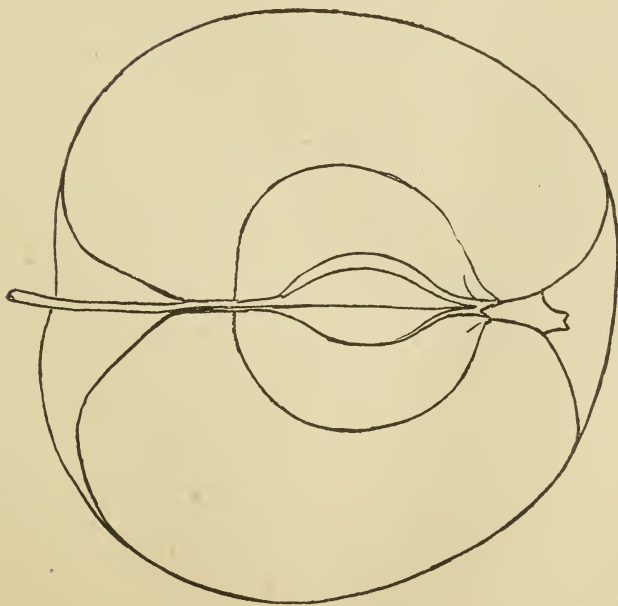


FIG. 3. APPLE—GRAND SULTAN.

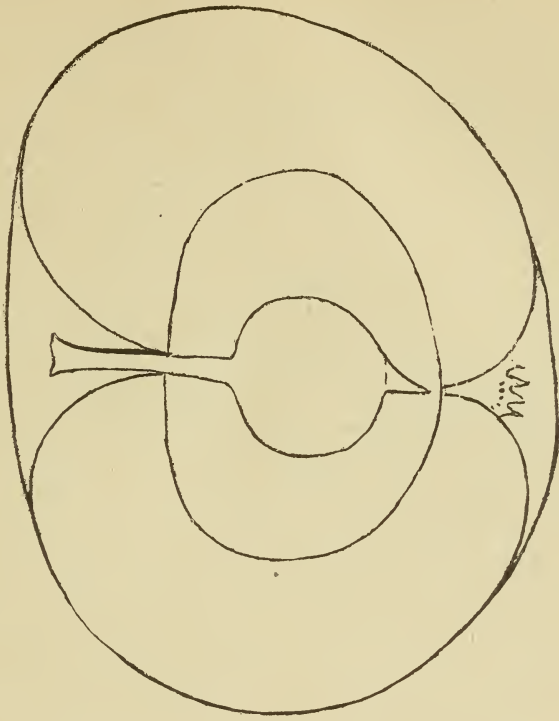


FIG. 4. APPLE—HAWTHORNDEN (NEW).

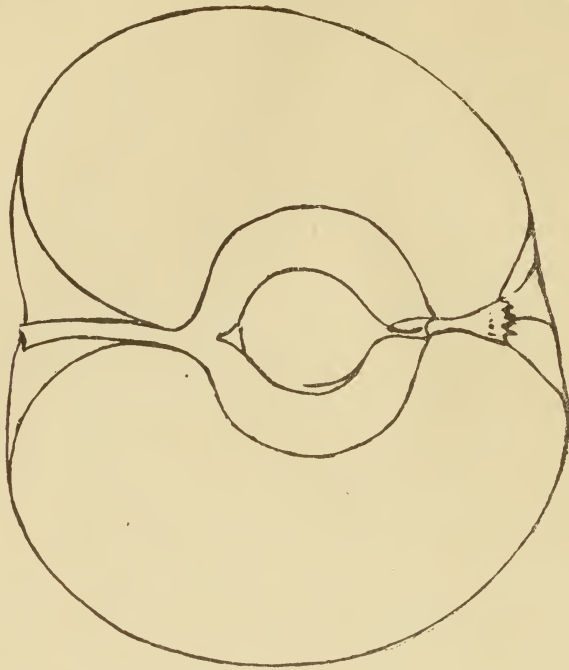


FIG. 6. APPLE-HURLBUT.

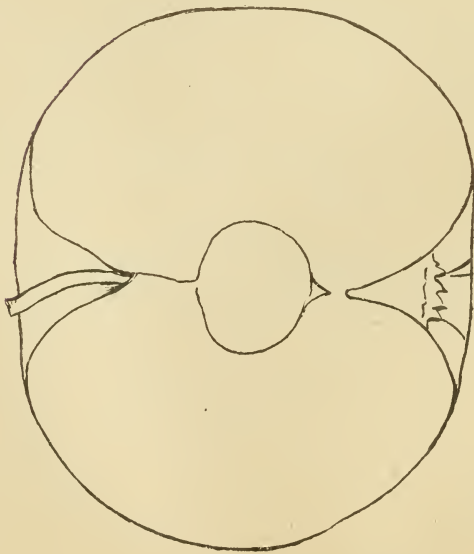


FIG. 5. APPLE-HAWTHORDEN (OLD).

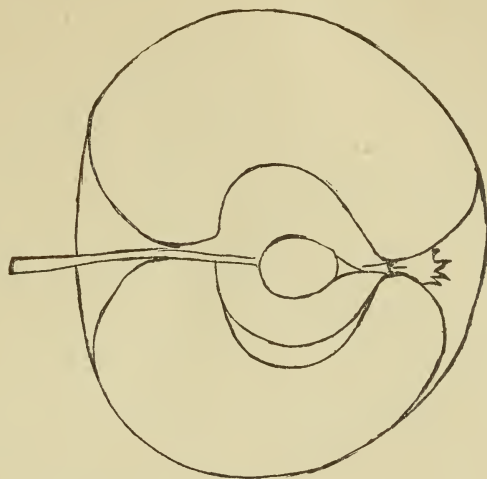


FIG. 8. APPLE—NORCASTER SPY.

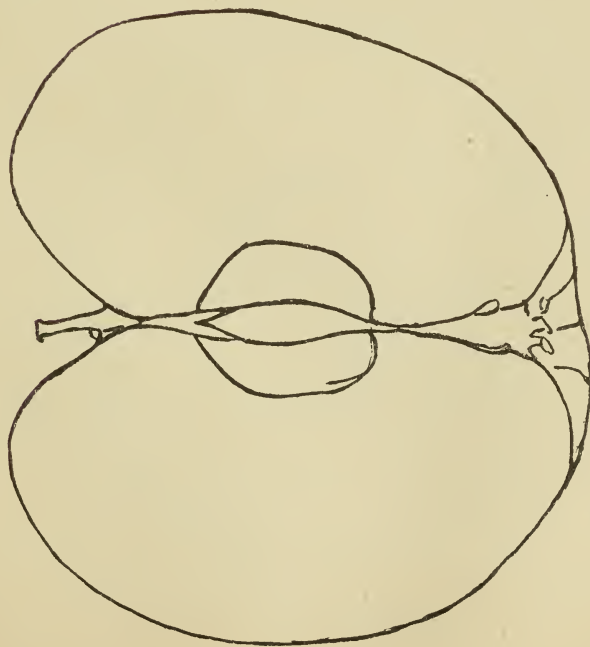


FIG. 7. APPLE—WINTER ST. LAWRENCE.

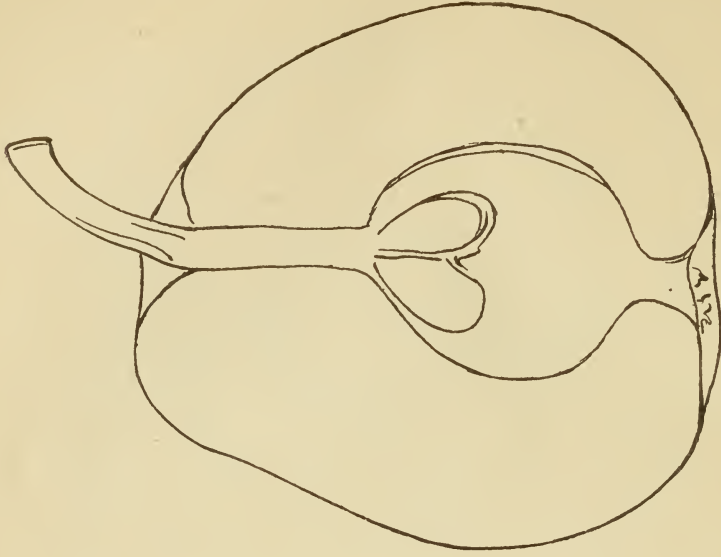


FIG. 10. PEAR—BRURRE GRIS D'HIVER.

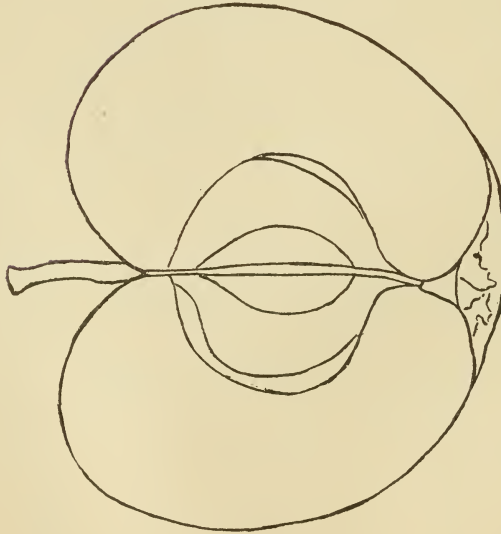


FIG. 9. APPLE—NORTHFIELD BEAUTY.

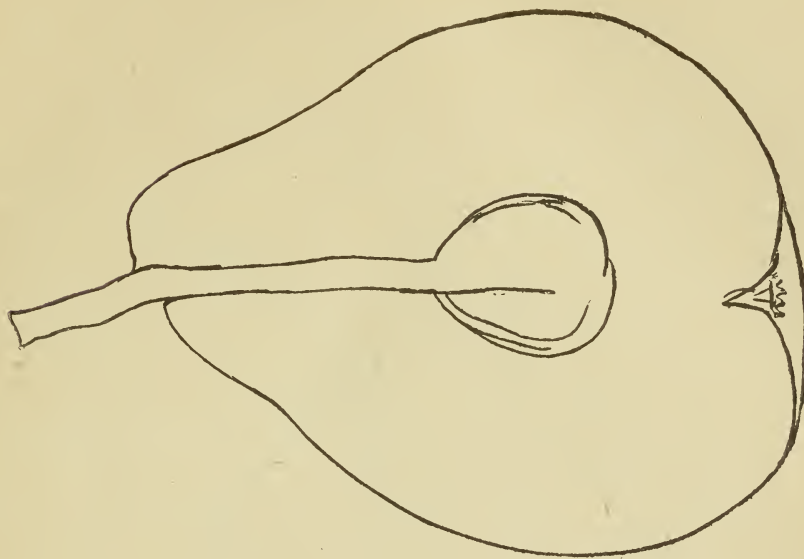


FIG. 12. PEAR—MOUNT VERNON.

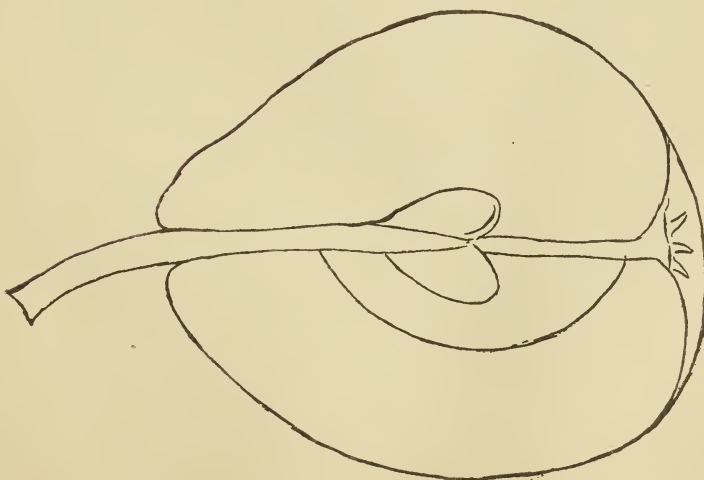


FIG. 11. PEAR—LAWRENCE.

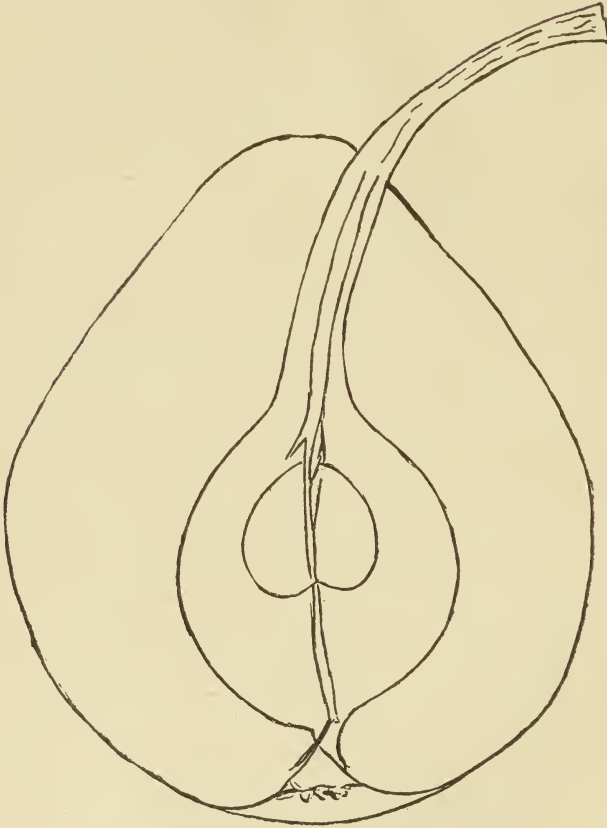


FIG. 13. PEAR—SWAN'S ORANGE.

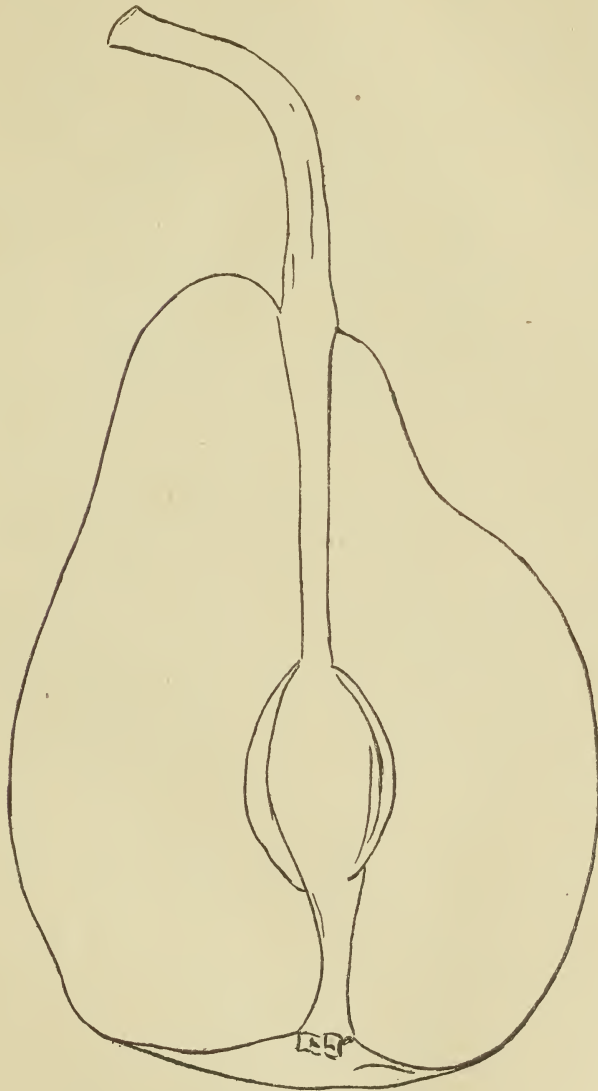


FIG. 14. PEAR—GENERAL TODLEBEN.

REPORT OF SIMCOE EXPERIMENT STATION.—G. C. CASTON, EXPERIMENTER, CRAIGHURST, ONTARIO.

APPLES.—DESCRIPTIVE LIST.

Origin : Originator, place, date, parentage.

Foliage : Subject to diseases, size, glossiness, quantity.

Habit : S, Spreading ; U, Upright ; D, Drooping.

Size : S, Small, less than 1½ inches in diameter ; M, Medium, 1½ to 3½ inches in diameter ; L, Large, over 3½ inches in diameter.

Form : C, Conical ; R C, Roundish Conical ; R Ob, Roundish Oblate ; R, Roundish.

Cavity : S, Shallow ; N, Narrow ; D, Deep ; B, Broad ; L, Large ; irreg, irregular ; reg, regular ; W, Wide.

Stem : Length in inches.

Core : Shape and size of segments.

Variety.	Origin.	Tree.					Fruit.						
		Habit.	Foliage.	Vigor, scale 1-10.	Hardness, scale 1-10.	Productiveness, scale 1-10.	Age of bearing.	Size.	Form.	Color of skin.	Cavity.	Basin.	Calyx.
Alexander	Russia	S	healthy	10	10	10	7	L	C	greenish yellow, shaded with bright red	D	deep	large.
Astrachan, Red ..	Sweden to England 1816, probably Russian origin. Mr. La Rue, near Brockville, introduced by Mr. Baxter	U	healthy	9	10	8	7	M	R C	red	M	slight	partly closed.
Baxter or La Rue.	Mr. La Rue, near Brockville, introduced by Mr. Baxter	U	healthy	9	10	8	8	L	R C	red	M		
Ben Davis	Missouri	U	medium	9	9	10	7	M	C	yellowish with two shades of red	N D		
Colvert ..	.....	S	healthy	9	10	9	8	M-L	C ob	greenish-yellow splashed with red	rus't'd	wide, abrupt.	partly open.
Duchess	Russia	S	healthy	10	10	10	3	M	R ob	yellow, streaked with red ..	S	wide, even ..	large, nearly closed.
Fameuse	Canada, probably France	S	subject to fungus	8	8	10	6	M	R ob	red	N f'n'l sh'ped	shallow, narrow	small.
Gideon	Russia	U	very clean & healthy	10	10	10	5	L	C	white with red cheek	M		
Grimes Golden ..	Thos. Grimes, Brooke Co., Virginia	U	medium	7	5	8	7	M	C	yellow, when ripe	M		
Haas .....	.....	S	healthy	10	10	10	8	M	flat	red.			
Hurlbut	Gen. Hurlbut, Conn	S	healthy	8	9	8	9	M	R ob	yellow, red streaked with light dots	M	shallow	closed.
King of Tompkins	New Jersey	S	.....	7	5	5	10	L	R	red	L irr'g	medium, slightly corrugated ..	small, closed.

REPORT OF SIMCOE EXPERIMENT STATION.

APPLES.—DESCRIPTIVE LIST.—Continued.

Variety.	Origin.	Tree.					Fruit.					
		Habit.	Foliage.	Vigor, scale 1-10.	Hardiness, scale 1-10.	Productiveness, scale 1-10.	Age of bearing.	Size.	Form.	Color of skin.	Cavity.	Basin.	Calyx.
Maiden's Blush	New Jersey	S	healthy	9	10	10	8	M	flat	lemon yellow, with bright crimson cheek	D	closed.
Mann	New York State	U	healthy	9	10	9	7	M	R obl.	green, turning yellow, with light and gray dots	M	large, slightly corrug'd
N. Spy	Near Rochester, N. Y.	U	healthy	9	7	9	13	M-L	R ob. C	red streaked	M	narrow, furrowed
Pewaukee	Seedling of Duchess Pewaukee, Wis.	U	healthy	10	10	8	6	M	C	red streaked	M	small, closed.
R. I. Greening	Yorkshire, Eng.	S	healthy	8	5	10	10	M	R ob.	green	M	small, closed.
Ribston Pippin	Yorkshire, Eng.	M	healthy	8	8	8	7	M	R C	brownish russet, tinged with red	M	small, closed.
St. Lawrence	Uncertain	US	healthy	9	10	10	8	M-L	Ob. C	streaked with red	L	firmly closed.
Talman Sweet	Rhode Island	US	healthy	10	10	9	8	M	R	whitish yellow, sometimes with a bluish line from stem to calyx	wide S	small, deep
Tetovsky	Russia	U	healthy	9	10	9	4	M	Ob C	yellow, striped with red, slight bloom.	wide S	small, deep
Twenty Oz.	Cayuga, N. Y., from Conn	M	healthy	9	9	8	8	L	R ob. C	red streaked	W.D	small.
Wealthy	Peter Gideon, St. Paul, Minn.	S	healthy	9	10	10	3-4	M	R ob	whitish yellow, shaded with deep crimson.	green russet	deep, abrupt, partly closed.
Wagener	Penn Yan, N. Y.	S	healthy	8	9	8	8	M	R ob	yellow, nearly covered with crimson.	L B irreg.	small, closed.
Yellow Transparent	Russia	U	healthy	10	10	8	4-5	L	. . . . .	yellow.		

REPORT OF SIMCOE EXPERIMENT STATION.

APPLES.—DESCRIPTIVE LIST.—Continued.

Variety.	Fruit.			Quality. Scale 1-10.		Value. Scale 1-10.		Remarks.
	Flesh.			Dessert.	Cooking.	Home market.	Foreign market.	
	Color.	Texture.	Flavor.						Season. (Months of use as Dec.-March.)
Alexander.....	yellowish white..	a little soft, juicy	pleasant.....	Oct.-Dec.....	5	10	9	Coming more into favor every year as one of our best selling fall apples. Not desirable to grow here.
Astrachan, Red...	white.....	crisp, moderately juicy.	spicy, acid.....	Aug.-Sept.....	8	8	7	
Baxter or La Rue.	white.....	firm.....	slightly acid.....	Oct.-Feb.....	4	9	8	Subject to fungus; that is the chief fault.
Ben Davis.....	white.....	firm.....	poor.....	Oct.-June.....	2	4	8	Its chief point of value is its long keeping quality.
Colvert.....	greenish white...	firm.....	brisk, sub-acid.....	Oct.-Jan.....	5	9	9	
Duchess.....	white.....	firm, juicy.....	pleasant acid when ripe....	Aug.-Sept.....	6	10	8	
Faneuse.....	very white, some times streaked with red.....	tender, juicy.....	pleasant, slight perfume....	Oct.-Jan.....	10	8	9	Most susceptible to fungus of any.
Gideon.....	white.....	firm.....	pleasant.....	Oct.-Dec.....	8	9	10	A handsome, clean prolific apple.
Grimes Golden...	yellow.....	compact, crisp, tender, juicy..	rich, sprightly, sub-acid, aromatic.....	Oct.-March....	9	4	6	Too tender for this section.
Haas.....	white, tinged with red.....	firm.....	poor.....	Oct.-Feb.....	4	7	7	Quality against it.
Hurlbut.....	white.....	crisp, tender, juicy	agreeable, rich, vinous, aromatic.....	Oct.-March....	8	8	8	A fairly good apple.
King of Tompkins	yellowish.....	juicy, tender....	aromatic.....	Oct.-March....	9	9	10	Does well here top-grafted on hardy stock.
Maiden's Blush...	white.....	tender.....	sprightly, pleasant, sub-acid.	Oct.-Dec or Jan	5	8	9	About equal to R. I. Greening.
Mann.....	yellowish.....	firm.....	pleasant when ripe, sub-acid	Jan.-April.....	8	9	10	A promising variety.
N. Spy.....	white.....	fine-grained, tender.....	slightly sub-acid, very finest	Oct.-May.....	10	10	10	The most popular winter variety here.
Pewaukee.....	white.....	.....	sub-acid, pleasant when ripe	Oct.-March....	6	8	9	Has the fault of dropping from tree.
R. I. Greening....	yellow.....	fine-grained, tender, crisp, juicy	pleasant aroma, rich.....	Oct.-May.....	8	10	9	

REPORT OF SIMCOE EXPERIMENT STATION.

APPLES.—DESCRIPTIVE LIST.—Concluded.

Variety.	Fruit.				Season. (Months of use as Dec.-March.)	Quality Scale 1-10.		Value. Scale 1-10.		Remarks.
	Flesh.			Flavor.		Dessert.	Cooking.	Home Market.	Foreign Market.	
	Color.	Texture.	Flavor.							
Ribston Pippin	white	firm	one of the best, fine flavor	Oct.-Feb. here.	10	8	10	10	Does fairly well here. Subject to fungus but a good market sort. Valuable as stock for top-graft- ing on. On account of large size and attractive appearance it sells well. Drops badly, must be picked before end of September.	
St. Lawrence	white	crisp, juicy, tender	pleasant, rich	Oct.-Nov.	10	9	9	5		
Talman Sweet	white	firm, fine-grained	sweet and rich	Oct.-March	6	5	2	5		
Tetovsky	white	juicy, soft	pleasant, sub-acid	August	7	9	6	9		
Twenty Oz.	whitish	coarse	sub-acid, poor	Oct.-Jan.	4	7	8	8		
Wealthy	white, stained with red.	fine-grained, ten- der, juicy.	pleasant, slightly acid, crisp	Sept.-Dec.	8	8	9	8		
Wagner	yellowish	tender, juicy, brisk.	excellent	Oct.-March	7	8	8	7		
Yellow Tr'sparent	white	firm	fair	August	6	8	6	6		

REPORT OF SIMCOE EXPERIMENT STATION.—Continued.

RASPBERRIES AND BLACKBERRIES.—DESCRIPTIVE LIST.

Size: S, Small; M, Medium; L, Large.

Flesh: F, Firm; S, Soft.

Form: R, Round; C, Conical; O, Ovate.

Season: E, Early; M, Medium; L, Late.

Color: D, Dark; R, Red; P, Purple; O, Orange; B, Bright.

Variety.	Plant.							Berry.					V'l'e scale 1-10.	Remarks.		
	Habit of growth.	Freedom from disease 1-10.	Propagation by tips or suckers.	Foliage.	Vigor, scale 1-10.	Hardiness, scale 1-10.	Productiveness, scale 1-10.	Size.	Form.	Color.	Flesh.	Flavor.			Season.	Dessert.	Market.
Cuthbert	upright strong..	10	suckers.	healthy.	9	7	10	L	R	R	F	good..	L	10	10	
Shaffer	spreading.	8	tips	healthy.	10	8	9	L	R	P	S	good..	L	8	6	Good for canning.
Golden Queen...	upright...	10	suckers.	healthy.	9	8	8	M	R	O	F	best..	L	10	10	A white Cuthbert.
Gregg	spreading.	5	tips ...	medium	8	8	8	L	R	B	F	M ...	L	8	9	Subject to blight.
BLACKBERRIES.																
Snyder	upright, strong	10	suckers.	healthy.	10	10	10	M	C	B	F	M ...	M	7	9	The hardest tried here.

STRAWBERRIES.—DESCRIPTIVE LIST.

Fruit Stalk: Long or short; above foliage or concealed by it.

Color: B, Bright; C, Crimson; D, Dark; L, Light; R, Red; S, Scarlet.

Size: S, Small; M, Medium; L, Large. Add average length and breadth in inches.

Flesh: F, Firm; S, Soft.

Form: B, Broad; C, Conical; D, Depressed; I, Irregular; L, Long; O, Ovate; R, Round.

Season: E, Early; M, Medium; L, Late.

Variety.	Plant.					Berry.					V'l'e scale 1-10.	Remarks.		
	Sex.	Foliage, healthy or liable to rust.	Fruit stalk.	Vigor, scale 1-10.	Productiveness, scale 1-10.	Size.	Form.	Color.	Flesh.	Flavor.			Season.	Dessert.	Market.
Wilson.....	S	liable to rust..	M	9	10	M	C	R	F	good.	M	8	10	The most reliable market variety among the older varieties.
Crescent	P	healthy.	L	10	10	L	I	S	M	acid..	E	7	9	
Sharpless	S	healthy.	S		5	L	I	R	S	one of best.	L	10	10	Not productive on light soil, suits best on clay loam.
Bubach, No. 5....	P	healthy.	S	9	9	L	C	R	M	good..	M	10	10	
Jessie	S	healthy.	L	9	7	L	C	R	S	good..	M	10	8	Not a success here.
Williams	S	healthy.	S	10	9	L	I	R	F	good..	M	9	9	
Haverland	P	healthy.	L	10	9	L	C	B	S	fine ..	L	10	7	A fine dessert berry but too soft for shipping.
Triumphede Gand.....	....	healthy.	L	10	7	M	R	B	S	too acid.	M	8	6	Not worthy of propagation.

REPORT OF SIMCOE EXPERIMENT STATION.

GRAPES.—DESCRIPTIVE LIST.

Species : E, Estivalis ; R, Riparia ; L, Labrusca ; Form : L, Long ; S, Short ; Sh, Shouldered.
 H, Hybrid ; X, Cross. Compactness : C, Close ; L, Loose ; St, Straggling.
 Size : S, Small ; M, Medium ; L, Large. Shape of Berry : Ov, Oval ; R, Round.
 Bloom : H, Heavy ; L, Light.
 Color : B, Black ; P, Purple ; R, Red ; W, White ; L, Light ; D, Dark.

Variety.	Vine.				Bunch.		Berry.					
	Species.	Foliage.	Vigor. Scale 1-10	Hardiness. Scale 1-10	Productiveness. Scale 1-10	Freedom from Disease 1-10	Form.	Compactness.	Size.	Shape.	Color.	Thick-ness.
Brighton .....	...	healthy.....	8	9	8	9	Sh	C	M	R	R	..
Champion .....	...	healthy.....	8	9	9	9	St	CC	M	R	B	M
Concord	L	healthy.....	10	10	10	10	Sh	CC	M	R	B	M
Delaware .....	...	healthy.....	9	9	9	9	Sh	CC	S	R	R	.....
Early Victor .....	...	healthy.....	8	10	9	9	Sh	CC	S	R	B	M
Lindley .....	...	medium.....	8	9	8	8	St	L	M	R	R	.....
Moore's Early	L	healthy.....	9	9	6	9	St	L	M	R	B	M
Niagara	L	healthy.....	10	10	10	10	Sh	CC	M	R	W	thick
Salem .....	...	healthy.....	9	9	8	8	St	L	M	R	R	.....
Worden	L	healthy.....	10	10	9	10	Sh	C	M	R	B	M

GRAPES.—Concluded.

Variety.	Berry.		Value. Scale 1-10.		Remarks.
	Flavor of flesh.	Season. (Months of use as Oct. Nov.)	Dessert.	Market.	
Brighton	very good	late	10	10	Rather late here.
Champion	acid.....	early Oct..	6	7	Poor quality.
Concord	sweet....	late	9	10	The best all round sort but rather late for this section.
Delaware	good	early Oct..	10	10	A good variety for clay soil.
Early Victor	sweet....	early	7	9	Does not ripen evenly.
Lindley	good	M	10	10	One of the best reds.
Moore's Early	sweet....	early Sept.	9	9	A good grape but poor bearer.
Niagara	foxy	Oct. & Nov.	9	9	
Salem	good	M	9	9	
Worden	sweet....	Oct. & Nov.	9	10	Resembles Concord but ripens earlier.

NOTES ON VARIETIES.

I received for planting of apples 85 varieties of Russians from the Experimental Farm at Ottawa. A list of the names of them I have already sent you, and I might here remark that any of these that might prove desirable and valuable for this section would require to have their names Americanized, so that ordinary mortals would be able to pronounce them. These trees were very small, most of them mere twigs, so that only part of them were planted in orchard row ; the rest were planted in nursery row, and will

be planted out later on. All of these lived and grew well, though the summer was very dry. They seem to be (judging from appearance of foliage and wood) of a hardy type, very much of the Duchess type, and I have no doubt are well suited to the climate of this section. We will, therefore, I am confident, be able to get out of all these varieties a number exactly suited for this section of country. Besides these I received 36 apple trees from A. M. Smith, St. Catharines, three each of the following varieties: Yellow Transparent, Bell and Bocskeop, Winter St. Lawrence, Titovka, Sutton Beauty, Stark, Longfield, Wallbridge, Haas, McIntosh Red, Shiawasee Beauty and Princess Louise. These were planted in orchard row and all lived and grew fairly well. Besides the trees I received several packages of scions for grafting; those from Vermont, being delayed in transit, were useless on arrival. Some from Quebec did fairly well. These were: Scott's Winter, Winter St. Lawrence, Wolf River, North West Greening. A number of scions were sent me of varieties I had been growing for fifteen years or more, these, of course, I did not use.

I had a number of Russian trees from the Ottawa Farm already under test. One of these, two years planted, bore fruit this year. It was the Hare Pipka, a large apple of the Alexander type, of fairly good quality, but affected by fungus spot. In connection with the apple experiments, I would suggest that provision be made for carrying on spraying experiments at each station, as that is now a very important item of the fruit industry.

I received, also, 14 varieties of plums, Yellow Gage, Monarch, Grand Duke, Quackenbos, Stanton, Rochester German Prune, Hudson River Yellow Egg, Middleburg, Shippers' Pride, Arch Duke, Black Diamond, Duane's Purple, Prince of Wales. These all grew well and will be watched with interest. I received also a number of Russian cherries. Five varieties of these were from Ottawa, viz., Bessarabian, Griotte Du Norde, Brussels Braun, Orel 24, Lutovka. They are of a dwarf habit of growth and appear very thrifty, and will bear young, so that we will soon be able to report on the quality of the fruit. Twelve cherry trees received from A. M. Smith all grew and thrived well. In small fruits, I received six varieties of gooseberries, viz., Downing, Smith's Improved, Industry, Red Jacket, Pearl, Houghton. With the exception of Red Jacket, these all did well. In currants, I received seven varieties: Lee's Prolific, Black Naples, Saunders, Champion, Varsailles, Cherry, Fay, all of which are doing well. Of raspberries, I received eight varieties: Marlboro, Kansas, Cromwell, Golden Queen, Turner, Older, Lovett and Palmer; of these two varieties, viz., Kansas and Cromwell, the rest are doing well. Of blackberries, four varieties: Kittatinny, Minnewaska, Agawam, Gainor. I hope some of these will prove hardy enough for this section. The Snyder does exceedingly well here and is perfectly hardy, but I would like to have one of better quality and larger. The Kittatinny has been tried here and found too tender, but I will try what winter protection will do for it. I also received 13 varieties of grapes: Green Mountain, Moore's Diamond, Jessica, Ives, Aminia, Amber Queen, Janesville, Missouri Riesling, Marmion, Cottage, Eaton, Moyer, Moore's Early. All these grew, but some of them are wrongly named. Some of them bore a bunch of fruit, and I found a black grape growing on a vine labelled a white variety. It is very important in this work that great care should be taken to have everything properly labelled and true to name. The growing of grapes for profit here is out of the question, as they can be produced with more certainty and much cheaper in southern Ontario, and the best we can do in this line is to recommend a few of the earlier ripening varieties of good quality for home use, or, in other words, for the amateur.

In strawberries, I received 40 varieties. The season was late and the weather dry at the time these were sent, so that they did not have a fair chance; yet they did remarkably well, only two varieties having entirely failed. The soil here (a warm loam) is well adapted to the growing of strawberries, and I expect to make some interesting and valuable experiments in this line in the future. I cannot, however, submit anything that would be of any value this year owing to the facts already mentioned, but hope next year to make the strawberry report both interesting and valuable to all those who take an interest in the growth of this very interesting and valuable fruit.

WENTWORTH STATION. RECORD OF EXPERIMENTS, 1894.

GRAPES.

Variety.	Origin.	When planted.	Soil.	Cultivation.	Fertilizers used.	Winter protection.	Weather favorable or unfavorable.	
Agawam	Rogers' Hybrid	1887	clay	Plowed from 2 to 3 times, and cultivated every week or ten days until the first week of August.	none	Not laid down.	favorable.	
Brighton (a)	Con. x Diana Ham	1882	"		"		"	"
Champion	Near Rochester, N.Y.	1882	"		stable manure..		"	"
Concord	E. W. Bull, Concord, Mass.	1874	"		"		"	"
Catawba (b)	N. Carolina, 70 years ago ..	1883	"		none		"	"
*Delaware (c)	Unknown, found in N.J.	1874	"		stable manure..		"	too dry.
Lindley	Rogers' Hybrid	1887	"		"		"	favorable.
*Massasoit	"	1883	blk. loam		none		"	"
Moore's Early	Con.—Seed by J. B. Moore.	1887	clay		ashes & n'ht.soil		"	too dry.
*Moyer	Chas. Reid's Seedling	1886	"		"		"	"
Niagara	Concord x Cassady	1882	"		none		"	favorable.
Worden	Concord Seedling	1884	"		stable manure..		"	too dry.
*Wilder	Rogers' Hybrid	1884	"		"		"	favorable.

GRAPES.—Continued.

Variety.	Date of maturity.	Date of gathering. (Berries, first and last.)	Yield.	Grade.			Average price. †
				Class 1.	Class 2.	Class 3.	
			lb.				cts.
Agawam	Oct. 12	Oct. 22	17½	17		½	3
Brighton (a)	Sept. 10	Sept. 10	8	8			3½
Champion	Aug. 24	Aug. 24 to 31	16	16			2¾
Concord	Sept. 18	Sept. 26	19	18	1		2
Catawba (b)	Oct. 20	Oct. 25	16¾	16		¾	5
*Delaware (c)	Sept. 7	Sept. 7 to 10	7½	7			4
Lindley	" 12	" 12 to 15	17	15	2		3½
*Massasoit	Aug. 31	Aug. 31	13	13			5
Moore's Early	" 28	" 28 to 31	6	6			4
*Moyer	" 28	" 28 to 31	5	5			5½
Niagara	Sept. 8	Sept. 8 to 29	17¾	16	1¾		2
Worden	Aug. 31	Aug. 31 to Sept. 12	16	14½	1		3
*Wilder	Sept. 24	Sept. 94 to Oct. 29	15	15			2½

* Affected with thrip. (a) About half a crop. (b) Very fine quality. (c) A very light crop.

† The above prices were obtained from retail dealers on orders given by them.

REPORT OF WENTWORTH EXPERIMENT STATION.—M. PETTIT, EXPERIMENTER, WINONA.

GRAPES.—DESCRIPTIVE LIST.

Species: E, *Estivalis*; R, *Riparia*; L, *Labrusca*; H, Hybrid; X, Cross;
 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.

Species: E, *Estivalis*; R, *Riparia*; L, *Labrusca*; H, Hybrid; X, Cross;
 Size: S, Small; M, Medium; L, Large.
 Form: L, Long; S, Short; Sh, Shouldered.

No.	Variety.	Origin.	Species.	Foliage.	Vigor, Scale 1-10.	Hardness, Scale 1-10.	Productiveness Scale 1-10.	Freedom from disease, 1-10.	Bunch.	
									Form.	Compactness.
1	Alvey (Hagar)	E X Vinifera, Maryland	EH	healthy	7	8	9	8	L	Sh
2	Agawam (Rogers 15)	BlackHamburg X Native Wild Mammoth. E. S. Rogers, Salem, Mass	LH	thick	9	6	8	4	L	Sh
3	Amber Queen	Massachusetts	LH	thick	7	6	8	6	L	Sh
4	August Giant	Hamburg X Marion, Massachusetts	RH	very strong	8	8	7	8	L	Sh
5	Barry (Rogers 43)	Hamburg X Marion, Massachusetts	LH	healthy	9	9	8	7	L	Sh
6	Brighton	Concord X Diana-Hamburg. Raised by Jacob Moore, Brighton, N.Y.	LV	thick	8	10	8	6	L	Sh
7	Catawba	A native of North Carolina. Name from Catawba river.	L	medium	10	10	8	6	L	Sh
8	Creveling	Columbia county, Pa	LH	healthy	6	9	7	9	L	Sh
9	Dracut Amber	J. W. Manning, Dracut, Mass	L	thick	6	5	6	7	L	Sh
10	Duchess	White Con. X Del. or Walter. A. J. Caywood, Newburgh, N. Y.	LH	medium	6	7	6	8	L	Sh
11	Emmelan	Chance Seedling	E	medium	4	5	5	7	M	Sh
12	Jefferson	Concord X Iona	L	thick	2	10	2	6	L	Sh
13	Lady	Concord Seedling	L	healthy	9	10	8	6	L	Sh
14	Lindley (Rogers 9)	Golden Chasselas X Wild Mammoth	LH	strong	9	10	8	6	L	Sh
15	Marion	Pennsylvania	R	thin	9	9	7	6	L	Sh
16	Massasoit (Rogers 3)	Concord Seedling	LH	healthy	9	9	5	7	L	Sh
17	Martha	Concord Seedling	L	light	4	6	4	6	L	Sh
18	Moore's Early	John B. Moore, Concord, Mass. Concord Seedling	L	thick	5	9	4	6	L	Sh
19	Noah	Seedling of Taylor, Illinois	R	strong	9	9	10	5	L	Sh
20	Perkins	Massachusetts	L	thick	8	8	7	6	L	Sh
21	Prentiss	J. W. Prentiss, Pultney, N. Y. Seedling of Isabella	L	weak	3	7	6	6	L	Sh
22	Rebecca	Accidental Seedling. New York State	L	strong	10	8	8	3	L	Sh
23	Requa (Rogers 28)	Hamburg X Wild Mammoth	LH	strong	10	8	8	6	L	Sh
24	Salen	Riparia X Labrusca	RH	strong	9	9	8	7	L	Sh
25	Taylor	Chance Seedling	L	strong	7	7	6	7	L	Sh
26	Vengennes	Seedling of Concord	LH	strong	7	7	7	7	L	Sh
27	Wilder	Seedling of Concord	L	strong	7	10	7	8	L	Sh
28	Worden	Seedling of Concord	L	strong	8	8	7	8	L	Sh
29	Wyoming Red	Seedling of Concord	L	strong	8	8	7	8	L	Sh

REPORT OF WENTWORTH EXPERIMENT STATION. — Concluded.

GRAPES. — DESCRIPTIVE LIST.

No.	Berry.				Seeds — number and size.	Season. (Months of use as Oct., Nov.)	Value. Scale 1-10.		Remarks.	
	Shape.	Color.	Skin. Thickness.	Pulp.			Flavor.	Dessert.		Market.
								Size.		
1	O	R	thick	none	sweet, vinous	October	2	2	Of little value.	
2	L	D	thin	soft	sweet, sprightly, aromatic	Oct. & Nov	9	9	Most productive on clay loam with hard	
3	M	P	thin	tender	sweet, pleasant	Oct. & Nov	6	5	Along keeper. [subsoil. Needs long pruning.	
4	L	O	thick	tender	sweet, pleasant	September	5	5	Too tender to ship.	
5	L	R	thin	very little	sweet, aromatic & vinous.	October	7	7	One of the best Black Rogers.	
6	L	R	medium	slight	rich, vinous, musky	September	8	10	Will ripen in favorable localities.	
7	L	R	thin	hard	rich, vinous, musky	Oct. & Nov	6	4		
8	L	O	thick	hard	rich, vinous, musky	September	2	4		
9	S	R	thin	none	rich, vinous, musky	September	5	6	A choice winter grape.	
10	S	R	thin	none	rich, vinous, musky	October	7	5		
11	M	R	thin	tender	rich, vinous, musky	September	6	6	Ripens too late.	
12	M	R	thin	tender	rich, vinous, musky	September	8	8	Not productive.	
13	S	R	thick	tender	rich, vinous, musky	September	9	9		
14	M	R	thick	tender	rich, vinous, musky	October	2	2		
15	S	R	thin	thick	rich, vinous, musky	September	6	8	Should be grown with other varieties to	
16	L	R	thin	thick	rich, vinous, musky	September	7	4	An amateur grape. [fertilize it.	
17	S	R	medium	pulpy	rich, vinous, musky	September	7	8	Not productive enough.	
18	L	R	thin	hard	rich, vinous, musky	October	2	3	Too poor in quality.	
19	M	R	thin	hard	rich, vinous, musky	September	3	5		
20	M	O	thick	pulpy	rich, vinous, musky	October	5	5	Overloads and does not ripen its wood.	
21	M	O	medium	none	rich, vinous, musky	October	8	5	An amateur grape.	
22	S	O	thin	none	rich, vinous, musky	September	8	8	One of the best Rogers.	
23	L	R	thin	none	rich, vinous, musky	September	8	9		
24	L	R	thick	none	rich, vinous, musky	September	8	9		
25	S	R	thin	none	rich, vinous, musky	October	2	2	Of no value.	
26	L	R	thick	slight	rich, vinous, musky	Oct. & Nov	6	8		
27	L	R	thick	slight	rich, vinous, musky	September	7	8		
28	L	R	thin	slight	rich, vinous, musky	September	9	8		
29	S	R	thin	hard	rich, vinous, musky	September	4	6	Very handsome but too poor in quality.	

NOTES ON VARIETIES.

At the Wentworth Experiment Station, at Winona, I have planted, this spring, for testing, 48 varieties of grapes, 28 of peaches, 18 of cherries, 22 of plums, 23 of strawberries, 9 of currants, and a few gooseberries, raspberries and blackberries. Of grapes that I have previously tested I will now refer to a few that have some good qualities to commend them.

August Giant. A very large black grape of fine appearance and good quality. It ripens with the Concord; is too tender to ship well.

Amber Queen. A handsome red grape, good shaped bunch; quality good; fairly productive.

Adirondac. A fine amateur grape of the highest quality; vine requires winter protection.

Agawam. One of the best.

Brighton is a cross between Concord and Diana Hamburg, and shows the Hamburg in both form of bunch and flavor. It is a valuable early market grape.

Catawba has been profitable with me. It always sells higher than any grape in the market; it requires close pruning to prevent overloading.

Champion has been, and is still, a very profitable grape; its extreme earliness and productiveness are its only good qualities.

Creveling is valuable for home use; it is early, good quality, and will hang on the vines and improve in flavor until frost.

Diana is a good grape for winter use, and makes a very choice wine.

Duchess. A good flavored white grape, flesh tender, free from pulp, sweet, spicy and rich; would be valuable if we had no Niagara.

Delaware always commands the highest price if properly grown; it requires close pruning, rich soil and good cultivation.

El Dorado is one of the finest flavored grapes in existence; good for amateur; not productive enough as a market grape.

Eumelan. Early, good flavor, and productive.

Goethe (Rogers' No. 1). Large, fine flavor, pink or red when fully ripe; hardy and very productive.

Herbert (Rog. No. 44) is one of the best black Rogers in appearance, flavor and productiveness.

Iona and *Jefferson* are both handsome red grapes, of good quality, but ripen late; suitable only for favorable localities.

Lady is a fine early white grape, of good quality; vine rather slow grower, but very hardy; it should be suitable for the north.

Lindley (Rog. No. 9), is one of the most profitable of all grapes that I have grown and one of the finest in appearance and flavor.

Massasoit (Rog. No. 3), the earliest of Rogers' grapes, good quality; does not fertilize well, is improved by planting alternately in the row with a good blooming variety.

Moore's Early. A good early grape, but not quite productive enough.

Niagara is far the most profitable white grape.

Moore's Diamond is a promising grape, good quality, fine appearance, and early.

Moyer is profitable, principally on account of its extreme earliness.

Requa (Rog. No. 28). A large compact bunch, good flavor; productive; resembles the Salem in appearance.

Wilder (Rog. No. 4) is one of the best black grapes for market, and holds its flavor with long keeping better than any other grape.

Worden. Very much like the Concord, of which it is a seedling, but sweeter and better in flavor, and a few days earlier, which makes it one of the most profitable.

EXPERIMENTAL SPRAYING.

The following experiments in spraying were conducted at the Wentworth Fruit Experiment Station, under the direction of Mr. John Craig, Horticulturist, Central Experimental Farm, Ottawa. The Bordeaux mixture was used, with Paris green added (four ounces to forty gallons):

Apple trees. Sprayed April 16th, May 4th, May 15th, May 29th, June 9th, June 29th. On two Fameuse trees sprayed thoroughly on the above dates there was scarcely a perfect specimen, but less scab than the previous year. Two Spy trees treated on the above dates were very much better than those unsprayed. Two Baldwins showed a very marked difference, one tree produced 286 No. 1 and 90 No. 2, the other 298 No. 1 and 164 No. 2, while the balance of the orchard under the same conditions, except spraying, had comparatively nothing on. Two good average trees were selected, one had 14 No. 1 and 31 No. 2, the other 11 No. 1 and 36 No. 2.

Pear trees. Sprayed on April 16th, May 4th, May 15th, May 29th, June 13th, June 29th. Flemish Beauty sprayed on the above dates produced 75 per cent. more fruit and of much better quality than unsprayed trees of the same age, cultivation and other conditions. Beurre Gifford trees sprayed on the above dates were loaded with perfectly clean fruit, while those not sprayed until the fungus appeared, which was very soon after the pears had formed, and then thoroughly sprayed on May 29th and June 9th, were almost an entire failure, scarcely any fruit and of poor quality. Bartletts showed but little difference between sprayed and unsprayed, which is accounted for as Bartletts were all comparatively free from fungus this season.

About fifty varieties of grapes were sprayed on April 16th, May 4th, May 29th, June 9th and June 29th, which gave no results, as we had no mildew or rot this season. Some leaf blight appeared on Delaware and Moyer that had been sprayed. Altogether I am highly pleased with the results. Like many other fruit growers in this section, I have sprayed for several years, but not thoroughly, and was not certain of any good results, which I think are just in comparison to the thoroughness of the work done. I also think from this season's experiments that two sprayings before the trees bloom, which is more easily done, is of more value than four times after. We hope next season to experiment more fully in spraying, also to test the value of early and late spraying.

REPORT OF SOUTHWESTERN FRUIT EXPERIMENT STATION.

W. W. HILLBORN, EXPERIMENTER, LEAMINGTON. ONT.

STRAWBERRIES.--DESCRIPTIVE LIST.

Fruit Stalk: Long or short; above foliage or concealed by it.

Size: S, small; M, medium; L, large.

Form: B, broad; C, conical; D, depressed; I, irregular; L, long; O, ovate; R, round.

Color: B, bright; C, crimson; D, dark; L, light; R, red; S, scarlet.

Flesh: F, firm; S, soft; M, medium.

Season: E, early; M, medium; L, late.

Variety.	Plant.				Berry.						Value Scale 1-10		
	Sex.	Foliage. Healthy or liable to rust.	Fruit stalk.	Vigor Scale 1-10.	Productiveness. Scale 1-10.	Size.	Form.	Color.	Flesh.	Flavor.	Season.	Dessert.	Market.
Bubach	P	Healthy	Med ..	8	10	L	B	LR	M	Med..	MtoL	8	*10
Beder Wood....	B	Some rust.....	Long ..	6	8	M	R	LR	M	Med..	E	8	+8
Crescent	P	Nearly healthy.	Med ..	10	10	M	C	S	M	Med..	E	8	9
Captain Jack ..	B	Some rust, mostly healthy	Long ..	7	6-9	M	R	S	M	Good.	L	8	8
Gov. Hoard	B	Little rust	Med ..	6	7	M	CD	DR	F	Good.	E	9	8
Lovett	B	Nearly healthy.	Med ..	7	8	M	C	C	F	Med..	M	7	8
Middlefield ...	P	Healthy	Med ..	8	6-8	MtoL	CB	BR	M	Good.	M	10	7
Parker Earle ...	B	Nearly healthy.	Tall....	8	7-9	M	C	BR	F	Med..	L	7	8
Saunders	B	Quite healthy..	Med ..	8	8	L	CD	DR	MtoF	MtoG	MtoL	8	8
Wilson	B	Sometimes rusts badly ..	Med ..	6	4-8	M	C	DR	F	MtoG	M	8	10
Williams	B	Some rust	Short ..	9-10	8-10	L	BDC	DR	M	Med..	MtoL	6	8-10
Woolverton ...	B	Not much rust.	Med ..	7	8	L	BC	BR	MtoF	Good.	MtoL	8	8

* 4 for distant market.

+ 3 for distant market.

NOTES ON VARIETIES.

The season of 1894 has not been favorable for the strawberry in this locality. The early part of the season was favorable to their growth. Just as the fruit began to ripen dry weather set in, and continued until the whole crop was gathered. The continued heat and drouth shortened up the crop fully one-half. Our first ripe berries were *Michell's Early*, and were gathered May 31st. This variety does not produce enough fruit to make it a profitable sort. Following soon was *Beder Wood*; this is productive, fruit about medium size, and taking all in all, it is perhaps the best first early berry. There is no first early kind that I have seen that quite fills the bill. *Crescent* is not quite so early as the above, but still continues to be the most profitable early sort, especially on strong soil. On a light, sandy soil it is not always satisfactory. For a market not too distant, *Bubach* has succeeded best with me. The fruit is very large, and such a bright red that it will bring a good price in any market. In a wet season it is not firm enough to ship to a distant market. Th's season it was shipped 200 miles and brought 13c. wholesale for the first picking. It ripens mid-season.

Gov. Hoard is about the earliest large berry, of good quality, and well worthy of very general trial. The plant is quite a strong grower, the fruit is large, dark bright red, quite firm, and better in quality than most varieties. *Saunders*, *Woolverton* and *Lovett* are all promising for market and home use, and should be more generally tested throughout the country. *Williams* is a new Canadian berry that yields a large crop of large fruit; it, however, has a green tip which is somewhat against it, although the fruit being large and of a bright dark red color, and produced in abundance, will make it a profitable late market variety. *Wilson* is still grown more largely than any other sort in this locality for market, and will, no doubt, continue to be for some time to come on account of its good shipping qualities. *Parker Earle* is one of the best late sorts for market or the amateur. It forms very large plants and but few runners; it is, therefore, well adapted to garden culture. It requires a moist soil, as it sets such a large quantity of fruit that it cannot bring it to maturity without plenty of moisture. *Middlefield* is a fine large berry of very fine quality, of attractive light red color; plant very healthy and free from rust and quite productive; better for the amateur than for market. *Warfield* is a failure here, although it succeeds in many localities. The above table shows a description of twelve varieties of strawberries grown at this Station.

PEACHES.

The peach crop in this locality was a large one this season. A large percentage of the early fruit was a little under size, owing to the unusually dry weather. About the middle of September rain came and helped later kinds very much.

I have 71 varieties planted, in all about 10,000 trees.

DESCRIPTIVE LIST OF VARIETIES WELL TESTED HERE.

(Described in order of ripening.)

Alexander. Tree moderately strong, grows hardy and 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.

Early Rivers. Tree a good grower and quite productive; fruit round, medium to large, straw color with a delicate pink cheek; flesh melting and of very fine quality. Will not stand shipping to a distant market.

Mountain Rose. Tree vigorous and healthy; fruit medium to large; skin greenish-white, streaked and suffused with red in the sun; flesh white, juicy and good. Not up to its usual standard this season.

Early Barnard. Tree a moderately strong grower, very hardy and productive. Fruit round, medium to large; skin yellow, reddish purple in the sun; flesh very rich and sweet, of the best quality, dark yellow, red at the stone. One of the most reliable sorts grown.

Early Crawford. Tree a free grower and productive in favorable seasons. The fruit buds are tender and are often killed when most other sorts escape. Fruit very large, oblong; skin yellow, with a fine red cheek; flesh yellow, rich and of fine quality.

Oldmixon. Tree a vigorous grower, not hardy in fruit buds, 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 and of excellent quality.

Tyhurst Seedling. Tree of small willowy growth, very hardy in wood and fruit bud, a very productive annual bearer. Fruit medium, round; skin, light yellow, sometimes carmine in the sun; flesh yellow, sweet and of the best quality.

Late Crawford. Tree vigorous and healthy, productive and somewhat hardier in fruit bud than Early Crawford. Fruit very large, roundish; skin yellow, with a fine dark red cheek; flesh yellow, red at the stone, of fine quality.

Hill's Chili. Tree of small willowy growth, very hardy in wood and fruit buds. A regular annual bearer, very productive. Fruit large, dull yellow, shaded with dull red, very downy; flesh yellow and of fair quality. Good for canning.

Golden Drop. Tree a moderately vigorous grower, hardy in wood and fruit buds, very productive; fruit medium to large, round; skin yellow, sometimes shaded with carmine in the sun; flesh yellow, sometimes a little dry, but of quite good quality. One of the best of its season which is just after Late Crawford.

Smock Free: Tree vigorous and productive; fruit large, oblong; skin light orange yellow mottled with red; flesh bright yellow, red at the stone. A splendid variety for shipping a long distance

Lemon Free: Tree very vigorous, hardy and productive; fruit very large, oval, pale lemon yellow, of excellent quality, sweet and rich, ripens just after Smock.

Salway: Tree vigorous and productive; fruit large, greenish yellow slightly suffused with red; flesh greenish yellow, medium quality; ripens in October. Valuable where it can be grown on account of its late ripening. This season we gathered and used the last of them October 21st.

NOTES ON VARIETIES.

Alexander, Amsden's June and Early Canada are all practically identical. The four most profitable varieties grown in this locality (of the older sort) have been Alexander, Barnard's Early, Tyhurst Seedling and Hill's Chili. The two latter are perhaps the most hardy in fruit buds, and give a good crop nearly every season. They are probably the most profitable sorts to plant in sections not well adapted to peach culture.

Among new varieties *Fitzgerald* is perhaps the most promising. It is of the Early Crawford type, and apparently an improvement on that old favorite. The fruit buds are more hardy and the young trees will begin to bear the second year from planting. The fruit is large; skin bright yellow suffused with red; flesh, deep yellow and of the best quality; stone not as large as in Crawford. It is yet too early in its history to speak definitely as to its many good qualities. It, however, shows indications of being the most valuable new peach I have seen. Its season of ripening is with or just after Early Crawford.

Boyle's Yellow is another quite new sort in this locality that is very promising. It is the first yellow fleshed peach to ripen with me. Fruit large, round; skin bright yellow suffused with carmine; flesh yellow, very rich and melting, of the best quality. Its fine quality, bright color and earliness, together with its productiveness, will, I think, make it quite popular when better known. *Lemon Free* is one of the most hardy and

productive varieties grown and of very fine quality. Fruit very large. I picked this season thirty specimens that filled an eight-quart basket. I fear, however, it may be a little too late in ripening for many portions of Ontario.

APRICOTS.

In the spring of 1890 I planted *J. L. Budd Alexis, Nicholas, Catherine, Alexander* and *Gibb* of the Russian varieties, and *Moorpark, Early Golden, Peach* and *Royal* of the European sorts. All have fruited this season except the two latter. The Russian varieties and *Early Golden* are all quite similar to each other in size and quality. All are too small in size to be of value here. There is a slight variation in time of ripening, quality and size, but not sufficient to make any of them worthy of special note. *Moorpark* is a splendid large variety, well worth planting in favorable localities. The fruit is large, about two inches in diameter each way. Skin orange in the shade, but deep orange or brownish red in the sun, marked with numerous dark specks and dots; flesh quite firm, bright orange, parting free from the stone, quite juicy with a rich and luscious flavor. The apricot blooms so early in the spring that it is liable to injury from late spring frosts to such an extent that it is doubtful if it will pay to plant it except where the frosts are kept in check by large bodies of water. The curculio is another serious drawback to the culture of the apricot. The little Turk appears to prefer it to any other fruit. The *Moorpark*, from some other cause, escaped very well this season with me while other sorts were badly injured.

JAPAN PLUMS.

I had in bearing this season the *Abundance, Ogon* and *Kelsey*.

Abundance is far the most valuable of the three. Tree a free, strong grower, quite hardy here and wonderfully productive, in fact, it is not surpassed in this respect by any other variety I have seen. Fruit nearly as large as *Lombard*, oblong; skin yellowish green ground, nearly covered with a bright purplish red, with heavy bloom; flesh orange yellow, not nearly as good in quality as *Lombard*; ripens early, can all be marketed before the European varieties are ripe. Its productiveness, earliness and beautiful appearance combined will make it a valuable market variety.

Ogon: Tree a moderate grower, quite productive; fruit large, nearly round; bright golden yellow; flesh firm, quite dry and of such poor quality that I do not consider it of any special value.

Kelsey: Tree not as hardy as the peach, hence of no value for Ontario. Fruit large, heart-shaped; skin yellow, nearly covered with red; flesh firm and of fair quality; stone small.

VOLUNTARY EXPERIMENTAL WORK.

The following reports on gooseberries and strawberries, by Mr. A. Morton, Brampton, Mr. Stanley Spillett, of Nantye, and Mr. A. Stevenson, Lowville, have been contributed in response to the personal solicitation of the Secretary and without remuneration. This work the Board gratefully acknowledges, and has pleasure in publishing the same for the public good.

VOLUNTEER REPORT BY A. MORTON, BRAMPTON, ONT.

GOOSEBERRIES.—DESCRIPTIVE LIST.

Form of Berry: R, Round; Ov, Oval; Ob, Oblong.
Color: R, Red; B, Black; W, White; G, Green; Y, Yellow.
Season: E, Early; M, Medium; L, Late.

Size: S, Small; M, Medium; L, Large.
Form: L, Long; S, Short; Sh, Shouldered.
Compactness: C, Close; L, Loose; St, Straggling.

Variety.	Plant.			Berry.					Value, Scale 1-10.		Remarks.	
	Vigor 1-10.	Productive-ness scale 1-10.	Freedom from mil-dew 1-10.	Size.	Form.	Skin.	Color.	Flavor (See Thomas.)	Season.	Dessert.		Market.
Crown Bob	8	9	free	L	R	few pr.	R	good	M	9	10	
Ocean Wave	8	6	free	L	L	sm	G	v. good	M	10	10	
Whitesmith	9	8	free	L	R	sm	W	good	M	10	10	
Wonderful	10	10	free	L	R	sm	R	v. good	M	10	10	
Bloodhound	9	9	free	L	R	sm	R	good	M	9	9	
Princess Royal	8	8	free	L	R	prickles	G Y	good	M	10	10	
Scotch Jam (rough)	10	10	free	M	R	prickles	R	fair	M	4	10	
Large Scotch Red	10	8	free	L	R	sm	R	good	L	9	9	
One-of-them	10	9	free	very L	R	prickles	Y G	good	M	10	10	
Two-to-one	10	9	free	very L	R	sm	R	good	M	10	10	
Industry	10	10	free	L	R L	sm	R	fair	M	7	7	
Shakespeare	7	6	free	L	R	sm	R	good	M	9	7	
Lancashire Lad	9	9	free	L	R	sm	R	good	M	10	10	
Yorkshire Lad	9	9	free	L	L R	prickles	R	good	M	10	10	
Morden's Golden Drop	9	10	free	M	R	sm	Y	good	M	10	10	
(The above varieties are all of English origin.)												
Champagne	9	9	free	L	L	sm	Y	good	E	10	10	
Ringer	8	8	free	V L	R	sm	Y	good	M	9	9	
Smolenski	8	7	free	L	L	sm	Y	good	M	9	9	
Keepsake	9	10	free	L	L	sm	G	good	M	9	9	
Duke of Sutherland	10	10	free	L	L	sm	G	good	M	10	10	
Coiner	9	9	free	L	R	prickles	Y G	good	M	10	8	
Thumper	10	9	free	L	R	sm	Y	good	M	9	9	
Gipsy Queen	10	8	free	L	R	sm	G	good	M	9	9	
Pindston Green Gage	10	9	free	S	R	sm	G	v. good	M	10	10	
Red Warrington	9	9	free	M	R	sm	R	v. good	M	10	8	
Companion	9	9	free	L	L	sm	G W	good	M	10	9	

Color not taking.

The sweetest and best flavored of all. Excellent dessert berry.

Unequaled for preserving.

The most inferior of all English ones I have.

VOLUNTEER REPORT ON 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.	Variety.	Plant.			
		Sex.	Origin.	Foliage. Healthy or liable to rust.	Fruit stalk.
<i>List No. 1.</i>					
1	Beder Wood.....	S	Seedling by Mr. Beder Wood, of Illinois	some rust	L
2	Cyclone	S	Seedling of Crescent and Cumberland by E. Cruse, of Kansas.	very healthy, no rust.	M to L
3	Enhance	S	Seedling of Sharpless and Windsor C by H. Young, of Ohio.	healthy	M
4	Greenville.....	P	Chance seedling by E. W. Buechly, of Ohio.	very healthy	M
5	Lovett	S	Cross of Wilson and Crescent in 1885 from Kentucky.	healthy	M to S
6	Michel's Early.....	S	Chance seedling, thought Crescent, by J. G. Michel, of Arkansas.	healthy	M
7	Muskingum	S	Seedling by G. Kearns, of Ohio	very healthy	M
8	Marshall	S	Chance seedling found by Mr. Ewell, of Mass.	some rust, but healthy	M
9	Parker Earle	S	Cross of Crescent and T. V. Munson's No. 8 by J. Nimon, of Texas.	some rust	M to S
10	Princeton Chief ...	P	Thought a cross of Crescent and Kentucky by T. W. Poscharsky, of Illinois.	healthy	L
11	Swindle	P	Seedling of Jersey Queen and Glendale by Mr. Smalley.	some rust	M
12	Timbrell	P	Seedling by H. S. Turnbull, of Orange Co., N. J.	healthy	M
13	Haverland	P	Seedling from Ohio	very healthy	L
14	Saunders	S	Seedling by John Little, of Ontario.....	healthy	M
15	Bubach	P	Seedling by Mr. Bubach, of Illinois	very healthy.....	M
16	Williams	S	Thought a seedling of Wilson from Ontario..	some rust, but healthy	M to S
<i>List No. 2.</i>					
1	Beverley	S	Seedling of Miner's Prolific.....	healthy	M
2	Clyde (not yet introduced).	S	Seedling of Cyclone by Dr. Stayman, Kansas	very healthy.....	L
3	Edgar Queen	P	From Edgar Co., Ill., by C. O. Curtis	some rust, but healthy	M
4	Gaudy	S	Seedling, Jersey Queen x Glendale	healthy	M
5	Leader	S	Seedling by J. C. Campbell, Mass.....	healthy	M
6	Maple Bank.....	P	Seedling of Crescent x Wilson	healthy	M
7	Phillip's Seedling..	S	Seedling of Crescent x Sharpless	some rust, but healthy	M
8	Tennessee Prolific.	S	Seedling of Crescent x Sharpless	very healthy	M to L
9	Van Deman	S	Seedling of Crescent x Capt. Jack, by J. P. Bauer.	healthy	M
10	Woolverton	S	Seedling by John Little, Ont	very healthy	M to L
<i>List No. 3.</i>					
1	Aroma.....	S	Seedling of Cumberland, 1889, by E. W. Cruse, of Kan.	very healthy	M
2	Auburn	P	Seedling of Haverland, Butler Co., Ohio ...	very healthy	S to M
3	Barton's Eclipse...	P	Seedling of Longfellow, Mr. Barton, Ky....	some rust, but healthy	M
4	Boynton	P	Thought Crescent x Sharpless, Albany, N. Y.	healthy	M to L

*Irregular.

—By E. B. STEVENSON, LOWVILLE, HALTON CO., 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.	Date of first bloom.	Flesh.	Flavor (see Thomas).	Season.	Dessert.	Market.	
1	6	8	M	R	L	May 15	M	medium .	E	6	8 4	Near. Distant.
2	9	9	M to L	RC	BR	" 13	F	good	E	8			8
3	9	8	L	R	DR	" 18	F	medium . .	M	6	10	
4	8	10	L	RC	BR	" 18	M	good	M	8	10 6	Near. Distant.
5	9	7	M to L	RC	D	" 19	F	medium . .	M	6			8
6	10	5	S	R	L	" 13	M	medium . .	E	6	8	
7	8	7	L	R	D	" 19	F	good	M	8	6	
8	8	6	L	R	D	" 18	F	good	M	8	7	
9	6	9	S	C	R	" 24	F	medium . .	M to L	8	8	
10	8	5	M	R	D	" 20	M	medium . .	L	8	8	
11	5	5	M	R	D	" 16	F	medium . .	M	6	7	
12	7	8	L	RC	D	" 18	F	good	L	9	6	
13	9	10	L	L	BS	" 15	M	good	E	8	10 6	Near. Distant.
14	9	9	L	RC	BR	" 28	F	very good.	M	9			9
15	7	9	VL	BC	D	" 17	M	good	M	8	10 6	Near. Distant.
16	9	8	L	RC	DR	" 30	M	M to poor	M	5			8
1	7	8	L	R	D	" 16	VF	good	M to L	8	9	
2	9	9.5	L	RC	BR	" 14	F	good	E	9	9	
3	8	5	M	RC	R	" 24	M	medium . .	M to L	7	6	
4	8	6	L	RC	BR	" 16	M	good	L	8	6	
5	5	5	L	RC	D	" 14	F	very good.	E	10	6	
6	9	8	L	RC	DBR	" 28	F	good	M to L	9	8	
7	9	7	L	RC	DR	" 23	M	medium . .	M	7	6	
8	10	9	M to L	RC	BS	" 18	M	good	M	8	8	
9	10	8	L	C	DC	" 13	F	very good.	EE	9	9	
10	9	8	VL	BC	BR	" 19	M to F	good	L	3	8	
1	8	8	L	RC	R	" 24	F	good	L	8	9	Fine large, late, firm, worth trying.
2	9	7	M to L	RC	DR	" 30	F	very good.	M	10	7	Best quality, not productive enough.
3	8	7	L	R	R	" 24	F	medium . .	M	7	7	Further trial.
4	9	9	M	C	LR	" 15	M	medium . .	E to M-	6	8	A good one, very like Crescent.

VOLUNTEER REPORT ON

Number.	Variety.	Plant.			
		Sex.	Origin.	Foliage. Healthy or liable to rust.	Fruit stalk.
<i>List No. 3.—Con.</i>					
5	Chairs	P	Thought Bubach x Sharpless, Maryland	healthy	M
6	Dayton	S	Chance seedling by D. Feicht, of Dayton, Ohio.	healthy	M
7	Dew	S	Said to be Manchester x Sharpless, by Mr. Dew, of Mich.	very healthy	M to L
8	Eureka.....	P	1881, seedling by Geo. Townsend, of Gorden, Ohio.	healthy	M
9	E. P. Roe	S	1887, chance seedling by W. B. Brown, New- burg.	some rust, but healthy	M
10	Gov. Hoard.....	S	Seedling by F. W. Loudon, Janesville, Wis.	healthy	M
11	Gen. Putnam.....	P	Thought seedling of Crescent x Cumberland .	some rust, but healthy	M
12	Gillespie	S	Seedling of Haverland, by S. Gillespie, Ohio.	healthy	M to L
13	Iowa Beauty.....	S	Seedling by C. P. Walworth, of Iowa.....	healthy	M
14	Longfield	P	Seedling by Dr. Stayman, of Kan.....	very healthy	M to L
15	Mrs. Cleveland...	P	1883, thought seedling of Cumberland, by Geo. Townsend, Ohio.	healthy	M
16	Warfield	P	Found growing wild by B. C. Warfield, of Ill., thought Crescent x with Wilson.	healthy	M to L

STRAWBERRIES.—Continued.

Number.	Plant.		Berry.						Value. Scale 1-10.		Remarks.	
	Vigor. Scale 1-10.	Productiveness. Scale 1-10.	Size.	Form.	Color.	Date of first bloom.	Flesh.	Flavor (see Thomas).	Season.	Dessert.		Market.
5	7	6	M	R	R	May 16	F	good	E to M	8	6	Hardly worth growing. Further trial.
6	9	6	L	RC	S	" 22	M to S	medium ..	M	7	8	
7	5	4	VL	CF	D	" 29	M	medium ..	L	7	4	Further trial.
8	8	5	L	RC	R	" 25	S	medium ..	L	6	5	Not worth much.
9	5	6	M	RC	L	" 26	S	medium ..	M to L	6	5	Worthless.
10	8	7	L	RC	R	" 16	F	good	M to L	9	7	Grand for first picking, soon over.
11	8	5	M	R	L	" 15	S	poor	E to M	5	4	Soft and poor, unworthy of trial.
12	8	7	L	L	S	" 15	VF	very good.	M	10	7	Best quality, not productive enough.
13	8	7	L	RC	D	" 24	F	very good.	M	10	7	Good for amateur.
14	9	9	M to L	C	D	" 24	F	medium ..	M to L	8	9	A good one.
15	8	6	M	R	L	" 22	S	poor	M	5	5	Worthless.
16	10	9	M	C	D	" 15	F	good	E to M	8	9	Well worth trying.

Varieties I have that will fruit in 1895. P—Pistillate and S—Staminate kinds.

Variety.	Sex.	Variety.	Sex.	Variety.	Sex.
Aroma	S	Glenfield	S	Oberholtzer's No. 4	P
Anna Forrest	SS	Gov. Hoard	SS	Ona	P
Arrow	P	Gandy	S	Parker Earle	S
Auburn	P	Gen. Putnam	P	Pawnee	S
Alabama	SS	Gillespie	S	Phillips	S
Accomack	SS	Gertrude	S	Princess	P
Afton	P	Gandy Belle	S	Primate	S
Alpine	SS	Haverland	P	Prize	P
America	SS	Howard's No. 25	S	Price	S
Annie Laurie	S	Howard's No. 41	P	Prince of Berries	P
Barton's Eclipse	P	Hatch Experi. Stn. No. 24	SS	Princeton Chief	P
Beverly	S	Hunt's No. 3	SS	Plow City	S
Bubach	P	Hanson	S	Robinson	S
Beder Wood	S	Hull's No. 6	..	Regina	P
Bessie	P	Hull's No. 8	..	Rio	S
Boynton	P	Hiawatha	..	Richmond	SS
Beebe	P	Iowa Beauty	S	Standard	S
Belle of Lacrosse	P	Ivanhoe	S	Swinale	P
Briggs'	P	Jucunda Improved	S	Stayman's No. 1	P
Bisel	P	Jersey Queen	P	Southard	S
Brandywine	SS	Jessie	SS	Shuster's Gem	P
Belle or No. 51	SS	Judsonia	S	Saunders	S
Beedes' No. 1	SS	Jarabolo	S	Stevens	S
Beauty	SS	Kossuth	S	Smith's Seedling	S
Clyde	SS	Klickita	P	Sunny Side	P
Cyclone	SS	Kansas Prolific	S	Snowball	S
Crusis No. 9	SS	Lady Rusk	P	Scarlet Ball	..
Crawford's No. 51	SS	Leader	S	Seedling A	P
Clark's E	SS	Longfield	P	Stendid	S
Crimson Cluster	SS	Lovett's	SS	Stone's Early	P
Chairs	SS	Leroy	P	" No. 15	..
Charlie	P	Magnate	P	" No. 16	..
Carrie	P	Maple Bank	P	" No. 7	..
Dayton	SS	Middlefield	P	Stump	..
Dew	S	Mrs. Cleveland	P	Springdale	S
Dr. Arp	P	Martha	P	Seedling Superb	..
Della K	SS	Michael's E.	S	Staples	..
Edward's Favorite	S	Meek's E.	S	Tennessee Prolific	S
Eureka	P	Muskingam	SS	Timbrell	P
Enhance	S	Mary	P	Thompson's 104	..
Early Idaho	S	Marshall	S	Van Deman	S
Edgar Queen	P	Margaret	P	Warfield	P
E. P. Roe	P	Nehring's Gem	P	Williams	S
Epping	P	No Name	SS	Woolverton	S
Effie May	S	Northern	S	Westbrook	P
Edith	P	Nectar	S	Watson	P
Equinox	S	Ohio Centennial	S P	Wicomico	S
Farnsworth	S	Oberholtzer's No. 1	S	Wentzell	..
Fremont	S	" No. 2	P	Wm. Belt	S
Greenville	P	" No. 3	P		

I have in addition to these some 300 seedlings of choice crosses, some of which will fruit.

I have the following offered to me to test, to be sent in the spring: Holland; West Lawn; Pine Hill No. 40; Leviathan, Howard's No. 6 S.; Howard's 501; Howard's 23; Riehl's Nos. 5 and 6 and Nan.

NOTES ON VARIETIES OF STRAWBERRIES FOR 1894.

This has been a fairly profitable year for strawberries, fair crops and good prices. Soil here, sandy loam, enriched with stable manure and well cultivated. Most of the kinds are grown in narrow matted rows, some few in hills. Of the ninety varieties that I fruited this year, the best are as follows:

Older Kinds. Bederwood, Bubach, Haverland, Jersey Queen, Saunders and Van Deman.

Newer Kinds. Barton's Eclipse, Greenville, Muskingum, Southard, Tennessee Prolific and Woolverton.

Newest Kinds. Aroma, Clyde, Cyclone, Longfield, Magnate, Maple Bark and Robinson.

A frost on evenings of May 13th took the first blooms off Cyclone, Beder Wood, Van Deman and Michel's Early, again, May 28th a sharp frost hurt most of the kinds very much. Some I think, one-half. Some did not recover, others seem to develop later buds and produced a fair crop of berries. Below is a list of valuable kinds and how they have done here this year.

Beder Wood. (P). A seedling grown by Mr. Beder Wood of Illinois, good grower and one of the earliest, medium size, good yielder, greatest fault does not ripen evenly, some rust, rich in pollen, rather soft.

Cyclone. (S). A seedling of Crescent and Cumberland, grown by E. W. Cruse of Kansas, a good healthy grower, early, medium in size, very productive, good quality, a very promising kind, well worth trying, firm berry.

Enhance. (S). A seedling of Windsor Chief and Sharpless grown by H. Young of Ohio, a vigorous grower, season medium, large size and productive, of medium quality, berries are somewhat irregular and sour, very firm, good shipper.

Greenville. (P). A chance seedling by E. M. Bueckly of Ohio, very much like Bubach in plant and growth, more vigorous though, season medium, large size, very productive, of fair quality and medium firmness, its productiveness and size make it a first-class berry for home or near market, a good one.

Lovett. (S). A seedling of Crescent and Wilson in 1835 from Kentucky—good grower, medium in season and size, fairly productive, poor quality, firm.

Michel's Early. (S). A chance seedling, thought to be from Crescent, by J. T. Michel of Ark., a rampant grower, season early, medium to small size, poor in productiveness, quality fair and medium firmness.

Muskingum. (S). A seedling by Grant Kearns of Muskingum, Co., Ohio, a strong, healthy grower. It is refreshing to find a new kind coming within sight of what was claimed for it, and this the Muskingum does. Season too late, medium large size, fairly productive, good quality and firm, a good berry.

Marshall. (S). A chance seedling found on a stone heap by Mr. Ewell of Massachusetts—a healthy, fairly vigorous grower, season medium, berries of the largest size, only moderately productive, quality good and firm, one of the best to grow for show berries.

Parker Earle. (S). A seedling of Crescent crossed with T. V. Munson's No. 8, by J. Nimon of Texas. Makes few runners; season late, very productive, in fact too productive, cannot mature the great number of berries it sets; quality fair, firm, it rusts, unless you have a rich moist soil, or near plenty of water it is not worth growing, it cannot stand our hot dry fruiting season.

Princeton Chief. (P). Thought to be a cross of Crescent and Kentucky, by T. W. Poscharsky, of Illinois, a healthy grower, season late, medium size, not productive enough, medium in quality and firmness, hardly worth trying.

Swindle. (P). A seedling of Jersey Queen and Glendale, by Mr. Smally. It rusts some, season medium, size medium, also productiveness medium. The berry is well named, would not advise anyone to grow it.

Timbrell. (P). A seedling by H. S. Timbrell of Orange Co., N. Y., a healthy, fairly vigorous grower, season late, size large and fairly productive, quality good and firm—with me it did not ripen evenly; this I think will be a serious drawback to its taking a place among the standards.

Haverland. (P). A seedling from Ohio. Here is one of the best, if not the best of the standards, it does well everywhere, it will bear as many berries as the Crescent and will average $\frac{1}{2}$ larger, and just as firm as Crescent, a vigorous, healthy grower, season early to medium, size large and very productive, quality good and medium in firmness; would advise everyone growing for market to try the Haverland.

Saunders. (S). Seedling by John Little of Ont., one of the best, its only fault is it rusts some when allowed to set plants too thickly, a vigorous grower, season medium, size large, very productive, best quality and firm, rich in pollen, a good fertilizer. It is a far better kind than Williams in every way.

Bubach. (P). A seedling by Mr. Bubach of Illinois. Here is another to stand by. Hard to beat it, does well everywhere, reports are all good of the Bubach, fairly vigorous grower, season early to medium, large size and productive, very large berries and lots of them, quality good and firmness medium.

Williams. (S). A seedling from about Cainsville, Ont. Some rust but vigorous grower, season medium, size medium to large, fairly productive, poor quality and firm, does not ripen evenly. Not as good as Saunders in any way.

Beverly. (S). A seedling of Miner's Prolific, a healthy, fairly vigorous grower, season medium to late, size large and good flavor, very firm, it was hurt by frost when in blossom. I feel sure from the amount of bloom it will be very productive.

Clyde. (S). Seedling of Cyclone, by Dr. Stayman of Kansas. It has not been introduced yet, and no plants are for sale yet. It is one of the best I had on the place, a vigorous, healthy grower, not a trace of rust, season early, size large and very productive, quality good and firm, berries very attractive. It will I believe be given a place among the standards; much like Haverland in plant growth and quite as vigorous.

Edgar Queen. (P). A seedling from Edgar Co., Ill., by O. O. Curtis. Some rust, fair grower, season medium, size medium, quality medium, light yielder, hardly worth growing.

Gandy. (S). Seedling of Jersey Queen cross with Glendale, healthy growth, season late, size large, shy bearer, good quality, medium in firmness; it is grand for the first picking, soon over.

Leader. (S). A seedling by J. C. Campbell of Massachusetts. Disappointing this year, frost the reason, fairly healthy, not vigorous, season early, size medium to large, low in productiveness, best quality and firm, will give further trial.

Maple Bank. (P). Seedling of Crescent, cross Wilson, at least thought to be such, from Ontario, healthy vigorous grower, season medium to late, size large, productive, good quality and firm. A beautiful berry, shape somewhat like Crescent but quite as large again, and very much darker color. If it does as well in future as it has the past two seasons, it will be placed among the standards.

Philip's. (S). A seedling of Crescent cross Sharpless, a strong grower, though some rust, does well in hills, season medium, size large, productiveness medium, quality fair and firmness fair, a shy bearer in matted rows.

Tennessee Prolific. (S). Seedling of Crescent, cross with Sharpless, a very vigorous, healthy grower, season medium, size fair to large, very productive, well named, quality fair and fairly firm, well worth trying, it is a good one.

Van Deman. (S). A seedling of Crescent, cross with Capt. Jack by J. C. Bauer of Arkansas, a very vigorous grower, some rust when rows too thickly matted; season extra early, before Michel's E. or Beder Wood. Size large and very productive, of good quality and firm, a good one to fertilize Haverland, Warfield, Bubach and other early pistillates.

Woolverton. (S). A seedling by John Little of Ontario. A good healthy grower, season late, size very large, fairly productive, of good quality and firmness medium; a very valuable one, as it is very rich in pollen and blooms early, and continues through the season, fine dark color, well worth growing.

VOLUNTEER REPORT BY STANLEY SPILLETT, NANTYE, ONT.

GOOSEBERRIES—DESCRIPTIVE LIST.

Size : S, Small ; M, Medium ; L, Large.

Form : L, Long ; S, Short ; Sh., Shouldered.

Compactness : C, Close ; L, Loose ; St., Straggling.

Form of Berry : R, Round ; Ov., Oval ; Ob., Oblong.

Color : R, Red ; B, Black ; W, White ; G, Green ; Y, Yellow.

Season : E, Early ; M, Medium ; L, Late.

Variety.	Plant.					Berry.			
	Origin.	Foliage.	Vigor, Scale 1-10.	Freedom from mildew 1-10.	Productive- ness, Scale 1-10.	Size.	Form.	Color.	Flavor.
Autocrat	English	fair	8	8	8	L	ob.	G	good ...
Champion	American	very good	9	9	10	M	ob.	G	fair ...
Chautauqua	English	fair	8	.....	.....	.....	.....	.....	.....
Downing	American	fair	8	9	9	M	R	G	good ...
Lancashire Lad.	English	fair	8	.....	8	L	ob.	R	v. good.
Pearl	Amer. and Eng.	good	9	9	9	M	R	G	good ...
Queen .....	.....	good	9	.....	9	L	ov.	Y	good ...
Red Jacket	American	good	8	.....	.....	.....	.....	.....	.....
Triumph	English	fair	7	.....	.....	.....	.....	.....	.....
Whitesmith	English	fair	8	.....	8	.....	.....	.....	.....

NOTES ON VARIETIES.

I beg to offer for your consideration the following supplementary report upon the varieties of gooseberries grown by me. I do not think originators in general know for a certainty the parentage of new varieties they have originated. Taking it all round as a medium-sized berry the Pearl is hard to beat. More vigorous and with better foliage than the Downing it is bound to be generally planted. It yielded this year five quarts to the bush all round with me. Champion, the peer of the Pearl in vigor and foliage, and ahead of it apparently in productiveness and size of berry, is a cross of Downing upon a wild Rocky Mountain gooseberry—so the originator informs me. And it is certainly unlike, in habit of growth and appearance and shape of fruit, any other gooseberry I have ever seen. It is an upright grower, but the wood is long and slender like Houghton, but has not the drooping habit of that variety. In quality I do not think the fruit equal to Pearl. Neither fruit nor foliage has ever shown the least vestige of mildew. Queen is a promising variety having fine healthy foliage and appears very vigorous, leaves being still green though there has been some heavy frosts.

I may say that though by spraying with liver of sulphur most of the English varieties may be grown here successfully, in my opinion for general cultivation our future berry will be obtained along the line of a cross of the so-called American varieties upon the English.

Good authority differs from me upon this point, and contends that our future berry must be pure American and any English blood will certainly bring mildew. Pearl itself is a standing refutation of this contention. What we need is size and productiveness, and to obtain the latter we must have vigor and good foliage, both of which both Pearl and Champion have. They are, therefore, steps in the right direction. Now, if either of these varieties were crossed upon an English variety distinguished more for vigor and good foliage than for enormous size something desirable would be the result. I find that any variety that loses its leaves early in the fall is never productive. Many of these varieties named in report are new, and need further testing before they can be fully reported upon.

A word upon the subject of spraying may not be out of place. My bushes were sprayed with Bordeaux mixture for the protection of the foliage against rust, with the result that little if any rust made its appearance, and the leaves are still green on most varieties. Liver of sulphur was used for mildew with very satisfactory results, even Whitesmith remained free and clean throughout the season.

I shall vary my method another year, spraying some with Bordeaux and others with liver of sulphur alone, while others shall be left unsprayed of every variety.

REVIEWING THE SITUATION.

Spraying has passed the experimental stage and is now a recognized necessity by both orchardists and small fruit growers. Any of the different patterns of air-pumps enables the orchardist to spray his trees thoroughly and quickly. The small fruit grower is less fortunate, and this probably arises from his needing a more complex implement than the orchardist.

Power and the conversion of the liquid into spray or water-dust are the essentials of the apparatus needed by the orchardist. Transportation is an easy matter when the trees are far enough apart to allow a wagon, stone-boat or hand truck to pass between the rows. When the spaces between rows are not more than two feet, and often where bushes are large, transportation becomes the difficult problem of the three. The truth of this contention is seen in the variety of devices resorted to, none of them combining all the best principles found in all.

Pumps on the principle of the syringe or common pump, no matter whether the water is forced through the rose by the return of the plunger or by lever or by the compression of a bulb by hand—are all lacking in power and evenness of flow.

The knapsack method of transportation, even when furnished with air-pump, has its weakness, not the least of which are getting loaded up and carrying a cold poultice on one's back while the body is in a heated state, which, if not injurious to the health, is very disagreeable.

Again, the small pumps that work from a pail are all right as far as the pump goes, but that way of carrying a burden about is too primitive.

The wagon, the stone-boat or even the two wheel hand truck are not admissible among small fruit, so there is nothing for it but to go to wheelbarrow. This, with a keg so arranged as to take the place of legs, and supplied with a light-force pump with lever handle would be the *ne plus ultra* for small fruit spraying. This combination is not obtainable so far as I can find out, though all are found in the different implements.

PEA STRAW AS A MULCH.

I was induced last spring to experiment with pea-straw as a mulch. Farmers here make no use of this straw, and often burn it. That used had been run through an ordinary grain thresher.

Three plots, each 24x50 feet, were selected. No. 1 was covered with this straw to the depth of about four inches. No. 2 was cultivated continually throughout the summer about two inches deep, with a Planet, jr., wheel-hoe and scuffler. No. 3 received no cultivation any more than to cut the weeds.

At the end of the severe drouth of last summer the three plots were examined in the presence of several farmers. The soil in No. 1 was so moist that it could be mixed like putty. Every man said he could not have believed it if he had not seen it. No. 2, though moist, was not so moist as No. 1. No. 3 was as dry at the depth of ten inches as at the surface.

Test No. 2 was made on a row of evergreens to smother out and rot a piece of June grass sod. About six inches of the straw was applied, and very little grass came through during the summer.

A gentleman here (a farmer) informs me that he covered a weedy garden plot infested with Canadian thistles with this straw in the spring, with the result that this fall, when the mulch was removed, it was clean as a new pin.

A row of 14 pear trees, set this spring along my lane in holes dug in sod, a little larger than the roots extended, were mulched with this material. These trees not only came through the dry summer in good condition, but many of them made two feet of new wood, and they were not Kiefer.

As a rule the orchards in this district are in sod. This is the rule rather than the exception all over Ontario, I presume. Exhaustion of the soil is the usual objection urged against this custom, and pasturing with sheep or hogs the usual remedy recommended. A far more serious objection to this practice is the absorption and evaporation of the moisture from the soil by the grass. Let anyone who is skeptical on this point turn up a spit in a fence corner during a dry spell, and he will be convinced.

Now, if a tree is depending upon water to dissolve and carry into its circulation the food necessary for its sustenance, and the tree is standing in a soil as dry as powder, it must starve no matter how rich the soil is.

We had an object lesson upon this subject last summer. For weeks and weeks apples made no visible growth, and when picking time came were far below their usual size, and who will say what effect this starving process had upon the vitality of the trees.

Many farmers have been converted to the necessity of cultivating their orchards, but are at a loss to know how to set about it. Let the plowing be done both ways, just deep enough to smother the grass (for with Mr. Hutt I fail to see what purpose is served by plowing deep) and as near the trees as the branches will permit. Now let the space about the trees which cannot be plowed be heavily mulched the first year to smother the grass, and more lightly for ever afterwards.

The model orchard in this section, planted eighteen years ago, was kept continually mulched for the first fourteen years, when it was discontinued and grass took possession. The apples in this orchard have grown smaller every year, and the crops have not increased in proportion to the age of the trees. Indeed this orchard gave more bushels three and four years ago than it does now.

NOTES ON GRAPES IN 1894, BY THE SECRETARY.

Of *black grapes*, the Concord still takes the lead. It is an excellent all-purpose grape of strong, vigorous *Labrusca* blood, and withstands more than most varieties all insects and fungi. It originated with E. Bull, of Concord, Mass., who, they say, is now living a poor man, notwithstanding he gave to the world so excellent a gift. This grape was first exhibited at Boston in 1853. My Concords were harvested this year between the 12th of September and the 12th of October. During this time they were constantly improving in flavor, and after the 1st of October they were, to my taste, much superior to the Worden. The yield was seven tons, and although these sold at the low price of \$30 per ton, yet I cannot complain when I compare the profits derived from other lines of agricultural produce.

Of the other black grapes I may mention Wilder. With me so far it is one of the finest black grapes in quality, but a poor bearer, yet it succeeds so well with others that I shall yet hope to have better results in the near future.

Moore's Early I am much pleased with as an early grape to precede the Concord. This year it colored well and sold well in the markets.

Black Giant is a large productive grape, but, in my opinion, very poor in quality.

Of *white grapes*, I do not yet know of any variety more profitable than the Niagara. It is like the Concord in productiveness, and nearly as healthy, but somewhat subject to *Peronospora*, which causes the berries to shell off, especially on poor land, and to become insipid. When well ripened I consider the Niagara an excellent general purpose grape, and, on account of its great yield, one of the most profitable; yet when you speak of it as a dessert grape, it lacks quality. Indeed it will surely be pronounced insipid by one who first tastes a Salem or Lindley.

The *Victoria*, one of the numerous seedlings raised by Mr. T. B. Miner, of Linden, N. Y., was this year a favorite white grape with me, and I am inclined to think that it will yet take the foremost place among white grapes. The bunches are well shaped, the

skin has a fine waxen lustre and heavy bloom, and the berries are of a good size and fair quality. The vine is very productive. By some this grape is called a White Concord.

Eldorado greatly took my attention this season. It is one of Rickett's seedlings, a cross between the Concord and Allen's Hybrid. The berry has a beautiful waxen white appearance, and when fully ripe attains a golden yellow color with a thin white bloom. It shows beautifully when contrasted with red and black grapes on a fruit dish. The quality is, in my opinion, most excellent.

The *Triumph* (Campbell's Concord Hybrid No. 6) also took my fancy, but unfortunately it is too late for our climate and does not ripen as well as the Catawba. Otherwise it is an excellent bearer and the bunches are very large and fine. It is a cross between the Concord and Chasselas Masque.

Noah is another grape that is a little late for Ontario, but ripened very well with me this season. The bunches are fine, but the berry is small. It is a heavy bearer. This grape was first disseminated in 1876.

The *Pocklington* ripened well this season at Grimsby, and is, in my opinion, superior to the Niagara in quality, but is not nearly so productive.

Of *red grapes*, the Lindley is my favorite red grape for profit. The vine is very healthy and productive, the fruit is of good quality and beautifully colored. It packs well in baskets with the Concord and Niagara, and these three so far are my favorites for the vineyard, for they sort up well together when I wish to make an assorted package of red, white and black grapes for dessert purposes. The Lindley was produced by Mr. Rogers by hybridizing the Wild Mammoth grape of New England with the Golden Chasselas.

The *Delaware* will probably rank as the choicest table grape, but I consider it scarcely productive enough to be planted largely for profit. This year it produced a crop of fine bunches, but, as a rule, averages less than the Lindley, and the vine is much less vigorous.

Woodruff Red was this year a most showy grape in my vineyard. The berries were large and of a bright carmine color with a heavy bloom. It ripens earlier than the Concord. The quality, however, of this grape is not good enough to deserve much commendation. Still for a fancy package of assorted grapes I would like to try for a change Woodruff Red for red, Victoria for white, and Wilder for black. This grape originated with Mr. C. H. Woodruff, of Ann Arbor, Mich., in 1874.

The *Brighton* grape did fairly well with me this season, but suffered from downy mildew more than usual. Perhaps it was because it grew in close proximity to the Salem, which is quite subject to that form of mildew. The skin of this grape is almost too tender to make it very desirable as a first-class shipping variety, and when fully ripe it is too dark in color to rank high as a red grape, but of all the grapes I know, none please me better for my own table.

FINANCIAL STATEMENT.

The following is the financial statement of the Board of Control for the year 1894 :

Receipts.		Expenditure.	
Legislative grant.....	\$1,000 00	Printing and stationery	\$209 00
Balance overdrawn.....	7 06	Trees and plants for testing at stations	160 97
		Allowance to experimenters	400 00
		Expenses incurred in selecting stations and in official visits to the same	91 00
		Salary of Secretary	50 00
		Board meetings	63 55
		Freight and duty	18 87
		Preliminary meetings of committee ...	8 50
		Postage and telegrams.....	5 17
Total	\$1,007 06	Total.....	\$1,007 06

TWENTY-FIFTH ANNUAL REPORT
OF THE
ENTOMOLOGICAL SOCIETY
OF
ONTARIO
1894.

(PUBLISHED BY ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.

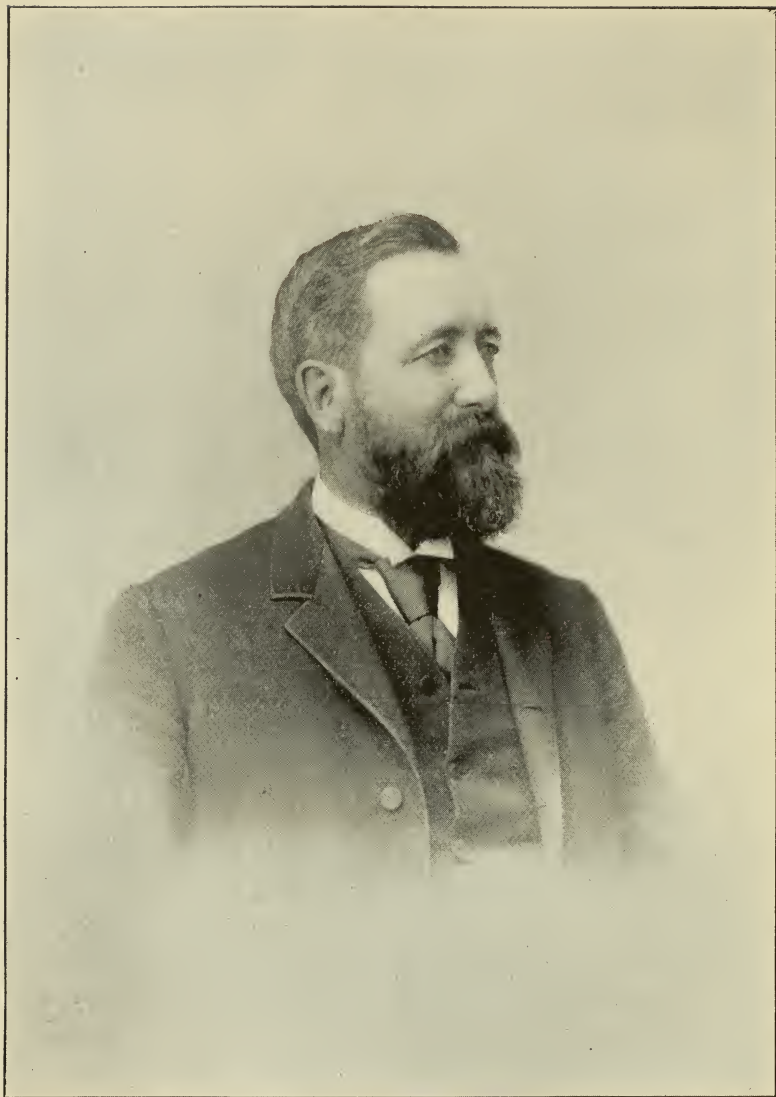


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CONTENTS.

	PAGE.
LETTER OF TRANSMISSION	1
LIST OF OFFICERS	2
ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY	3
Report of the Council	6
Report of the Librarian and Curator: J. A. MOFFAT	7
Annual Address of the President: W. H. HARRINGTON	9
Report of the Treasurer: J. A. BALKWILL	19
Report of the Montreal Branch: A. F. WINN	19
Report of the Geological Section: S. WOOLVERTON	20
Report of the Botanical Section: W. F. McCLEMENT	21
Report from the Entomological Society to the Royal Society of Canada: Rev. T. W. FYLES	22
Election of Officers	23
Insects collected in Bermuda during the winter of 1894: GAMBLE GEDDES	25
Common names for Butterflies—shall we have them: H. H. LYMAN	27
The Butterflies of the Eastern Provinces of Canada: Rev. C. J. S. BETHUNE	29
The Pitcher-plant Moth: JAMES FLETCHER	44
Catastega Aceriella Clemens, Semasia Signatana Clemens: Rev. T. W. FYLES	46
Notes on a few Canadian Coleoptera: W. H. HARRINGTON	47
Food, Feeders and Fed: Rev. T. W. FYLES	49
An Attack of <i>Ephestia Interpunctella</i> : H. A. STEVENSON	57
The Economic Value of Parasitism: F. M. WEBSTER	58
A Reappearance of <i>Pieris Protodice</i> , Boisd: J. A. MOFFAT	61
Remarks on the structure of the undeveloped wings of the Saturniidae: J. A. MOFFAT	63
Bordeaux Mixture as a deterrent against Flea Beetles: L. R. JONES	66
The Gypsy Moth: JAMES FLETCHER	67
The San José Scale: JAMES FLETCHER	73
Injurious Fruit Insects of the year 1894: JAMES FLETCHER	76
SIXTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS	82
A brief account of the rise and present condition of official Economic Entomology: L. O. HOWARD	82
Bisulphide of Carbon as an Insecticide: J. B. SMITH	102
Spraying with Arsenites <i>vs.</i> Bees: F. M. WEBSTER	104
Economic Entomological Work in the Parks of New York: E. B. SOUTHWICK	106
Professor C. V. Rile	112
Book Notices	113
Miscellaneous Entomological Papers by F. M. Webster, Feb., 1894	118
The Inter-Relation of Insects and Flowers: CHARLES ROBERTSON	119
A Pen Sketch of Prof. Wm. Saunders: F. W. GODING	120
Obituary	122
Index	125



PROFESSOR WILLIAM SAUNDERS, F.R.S.C.

Director of the Experimental Farm of the Dominion of Canada. President of the Entomological Society of Ontario, 1875-86. Editor of "The Canadian Entomologist," 1874-86.



AUGUSTUS RADCLIFFE GROTE, A.M.,

Honorary Member of the Entomological Society of Ontario (Elected Nov. 10, 1868); Vice-President of the American Association for the Advancement of Science, (1878), etc., etc.

TWENTY-FIFTH ANNUAL REPORT
OF THE
ENTOMOLOGICAL SOCIETY OF ONTARIO

1894.

To the Honorable the Minister of Agriculture :

SIR,—I have the honor to submit for your approval the twenty-fifth annual report of the Entomological Society of Ontario. The Council feels a pardonable pride in drawing your attention to the fact that they have now completed a quarter of a century's work in the investigation of the life histories of insects and their relation to agriculture and horticulture, and have embodied the results of their researches in twenty-five annual reports and twenty-six volumes of the *Canadian Entomologist*. This somewhat uncommon success in the case of a voluntary scientific society is, they feel, largely due to the support which has been received from the Legislature of Ontario, and for which they desire to record their grateful thanks.

The President's address and the various papers on economic and general entomology which are contained in the accompanying report will be found, it is trusted, as interesting and as useful as on previous occasions.

I have the honor to be, Sir,

Your obedient servant,

W. E. SAUNDERS,

Secretary.

OFFICERS FOR 1895.

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	REV. T. W. FYLES	South Quebec.
	J. M. DENTON	London.
	J. H. BOWMAN	do
 <i>Delegate to the Royal Society</i>	REV. T. W. FYLES	 South Quebec.
 <i>Committee on Field Days</i>	DR. WOOLVERTON, MESSRS. McCLEMENT, ELLIOTT AND STEVENSON	 London.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY.

The thirty-second annual meeting of the Entomological Society of Ontario was held in its rooms in Victoria Hall, London, on Wednesday and Thursday, November 7th and 8th, 1894, the President, Mr. W. H. HARRINGTON, F.R.S.C., of Ottawa, occupying the chair.

The meeting was called to order at 3 o'clock p.m. on Wednesday, when the following members were present: Rev. T. W. Fyles, South Quebec; Mr. H. H. Lyman, Montreal; Mr. James Fletcher, Ottawa; Rev. C. J. S. Bethune, Port Hope; Capt. Gamble Geddes, Toronto; Messrs. J. M. Denton, J. A. Balkwill, W. E. Saunders, J. A. Moffat, J. W. Dearness, W. Stevenson and H. P. Bock, London. A letter of apology was read from Mr. J. D. Evans, of Trenton, regretting his inability to attend the meeting.

After discussing the question of obtaining more suitable and commodious rooms for the society, which was also considered at the evening session, the first paper on the list was read by Capt. Geddes on "Some of the Insects of Bermuda collected during the Winter of 1893-4." The writer brought a number of interesting specimens to illustrate his remarks. Observations were made upon the paper by Dr. Bethune, who had visited the islands during the two previous winters and had found very few insects of any kind; the only butterflies he saw were *Danaïs Archippus* and *Junonia Cænia*, a few Geometer moths and Plusias flying about the lantana blossoms at dusk, and some beetles of the family Scarabaeidæ. As Capt. Geddes's visit had extended over four months his opportunities were very much greater and he had succeeded in making a very interesting collection.

Capt. Geddes gave an account of a remarkably late brood of the Camberwell Beauty butterfly, *Vanessa Antiopa*. He found the larvæ feeding on the yellow and partly faded leaves of a young elm tree in his garden, which they nearly stripped of its foliage; many of the caterpillars fell to the ground with the falling leaves on which they fed. The butterflies from this brood came out in the house on the 6th and 7th of November.

Mr. Lyman gave an account of his observations of the various broods of *Vanessa Milberti*. Hibernated specimens of the butterfly appear in early spring; the first brood from these was flying on the first of July, and colonies of larvæ were found feeding on nettles early in the month. Very young larvæ were found again on the mountain at Montreal on the 20th of August; these became full grown on the 13th of September and changed to pupæ on the 18th. Late in October the full colors of the butterfly were showing through the chrysalis case, but when he left home on the 5th of November, the butterflies had not emerged. Mr. Scudder, in his work on butterflies, states that this species has three broods in the New England States. Mr. Lyman thought that those now in the pupa state were the third brood at Montreal.

Dr. Bethune exhibited some specimens of rare Lepidoptera that he had taken this summer. Among them were *Limenitis Proserpina*, captured at Roach's Point, Lake Simcoe, on the 22nd of August; *Sphinx luscitiosa*, attracted by light at Port Hope, in June; a variety of *Catocala ilia* taken at sugar in July; *Plusia venusta*, Walk. (*striatella* Grote), attracted by light; an immaculate specimen of *Pieris rapæ*, etc. Mr. Fletcher stated that *L. Proserpina*, though excessively rare, had been taken at Rideau Hall, Ottawa.

Mr. Lyman read an interesting paper on "Common Names for Butterflies, Shall We Use Them?" In the discussion that followed Mr. Fletcher stated that common names would be given for all the Canadian species of butterflies in the handbook that he and Dr. Bethune were preparing for publication. The general opinion of those present was that it is highly desirable that ordinary English names should be used as far as practicable in order to promote the study and observation of insects.

Dr. Bethune then read "A List of the Butterflies of the Eastern Provinces of Canada," which contained no less than 116 species, of which the localities and in most cases the food plants and times of flight were given. The paper was commented on by Capt. Geddes, Messrs. Fletcher, Fyles and Lyman, who contributed much interesting information regarding a number of the species.

Mr. Fletcher exhibited specimens and gave an account of the remarkable habits of the moth *Ecyra Rolandiana*, the larva of which feeds upon the leaves of the pitcher plant, *Sarracenia purpurea*. He also exhibited an interesting collection of butterflies sent by Mr. Green, of British Columbia, and gave an account of a visit he made to Sudbury in May last, when, notwithstanding a snow storm that prevailed, he procured the larva of *Pamphila metacomet*, which fed on carex, and which he succeeded in rearing. He made some interesting remarks upon *Colibris elis*, *nastes* and *interior*, and gave an account of a rearing of *Colibris eurhytheme*, the eggs of which he had obtained at Nepigon in June. When the chrysalids were beginning to show the color of the butterfly he retarded their development for some weeks by placing them in a refrigerator, while emergence was hastened by exposure to electric light. He also showed some specimens of *Papilio Bairdii* and *P. Oregonia* received from Mr. Edwards, who had this year added yet another to his laurels by proving that these very dissimilar butterflies were really dimorphic forms of one species. Mr. Edwards had gone to Colorado and with great care had bred broods of larvae from eggs laid by both forms and had obtained from each brood some of both kinds of the butterflies named. This, the speaker said, he considered one of the greatest triumphs of this wonderful man. He had had the great pleasure of meeting Mr. Edwards in his own beautiful home amongst the mountains of West Virginia, where he hoped he would long be spared to carry on his useful studies with his characteristic energy, perseverance and accuracy.

Mr. Fletcher next exhibited specimens of *Pamphila metacomet* in all stages, egg, larva, pupa and cocoon and perfect butterfly, as well as an egg parasite, which had been named by Mr. Ashmead *Telenomus pamphilæ*, n.s. It was agreed at the last annual meeting that each member should try to work out the life history of at least one insect in time for this meeting: he had devoted his attention to *P. metacomet*, which is as a rule rarely taken at Ottawa. This fact, however, he thinks has been due to a want of knowledge as to its habits. He had previously taken the butterfly only in open glades in a wood, but the larvae feed on carices growing on exposed rocks. The food plant of this species as well as that of *P. mystic*, which he had also bred this year, was, he thought, not grasses, but sedges (carex), although in confinement they would eat grasses. The eggs are laid in July and the caterpillar passes two or sometimes three moults the same autumn and then hibernates in a case made by spinning three or four of the leaves of the food plant together. The larva is pale green, closely lined all over with broken white lines and covered with minute black piliferous tubercles. The most remarkable part of the larva is the head which is ornamented differently from that of any other species of the genus he was acquainted with. On the front, at the apex, is a large, velvety black area edged with white, and down either side of the face run two white lines with a dark area between them; behind these lines the head is black. The thoracic shield is ribbon-like, double, white in front, black behind. Just previous to pupation two large, white patches were plainly visible through the skin beneath segments 11 and 12. When ready to pupate the larva spins a close cocoon, similar to that of *Acronycta oblonga*, the end of which is stopped up with a silvery white, flakey powder which is emitted through the skin (apparently) from the two white patches mentioned. In three or four instances the pupa worked its way out of the cocoons and fell to the ground. It is piceous, when cleaned of the white silvery powder, slender and much elongated. The tongue case protrudes beyond the wing cases as in *Pamphila cernes*, etc. The abdomen beneath is closely covered with tawny bristles which are thickest at the cremastral end. The end of the body is furnished with about six short blunt spikes and on each side two larger ones. A more detailed account of the stages will appear later in the *Canadian Entomologist*.

The Rev. T. W. Fyles read a short paper on "*Catastega acerella-Semasia signatana*." In answer to an enquiry whether *Nematus Erichsoni*, the Larch saw-fly, was

still at work, he stated that it was still operating in the Province of Quebec, but in greatly reduced numbers. A tree here and there had been stripped this summer; in some cases part of the tree only had been affected. The insects were now attacking young trees—those from about ten to twenty or more feet in height. They seemed on their first arrival to pass by these, he supposed because the foliage of the more mature trees was more palatable to them. Some trees near Quebec that had been badly attacked and that he once thought would die, seemed to have made a struggle for life and had sent out numbers of small twigs on the stems and main branches, so as to present a very scrubby appearance. He had not been able to visit the large swamps in the Townships, but he believed the state of things there to be such as he had described in the society's Reports. He had been surprised to find in parts of the Gomin swamp affected by drainage numbers of small tamaracks from six inches to several feet high, where a few years ago none were to be seen. Mr. Harrington stated that in Cape Breton also he found young tamaracks growing up.

Mr. Fyles next gave an account of a strange food for the larvæ of *Pyrallis farinalis*. He said that in the society's Report for 1893, page 42, he gave a description of a *Lithocolletis* larva that he found feeding in blisters on the leaves of the white hazel, and which he hoped to rear. When full fed the larva spun a cocoon inside the blister, but his hope of obtaining the perfect insect was defeated in a strange manner. One the 3rd of March he examined the glass jar in which he had stored the blistered nut leaves, and over which he had tied a muslin cover. To his great surprise he found a number of Pyralid larvæ feeding upon the leaves. He described them as follows: Length, when extended, nine-tenths of an inch; head and prothoracic and anal plates, nut brown; the rest of the body, lead color: dorsal line, black. The appearance of the larvæ seemed familiar to him, but he let them be. They ate up the nut leaves, leaving only a tangle of the ribs and veins. In due time they produced a number of fine specimens of the moth *Pyrallis farinalis*, Linn.

Mr. Fyles stated that he wished to rectify a mistake. In the list of captures on page 41 of the annual Report for 1893 occurs the name *Anisota senatoria*; it should be *Anisota virginiensis*, Drury.

Mr. Harrington exhibited a collection of beetles from Japan, many of which were very beautiful and remarkable.

Mr. Lyman showed a box of specimens collected by Mr. Bean, at Laggan, Alberta, among which was a series of the moth *Nemophila petrosa*. An excellent photograph of these had been made, and it was resolved, on motion of Mr. Fletcher, seconded by Dr. Bethune, that Mr. Lyman be requested to have a plate prepared for publication in the *Canadian Entomologist*.

Mr. Fletcher exhibited a small collection of diurnals which had been sent down for identification by Mr. A. W. Hanham, of Winnipeg. Attention was drawn to specimens of *Thymelicus Garita*, this being probably the most eastern record; *Lycena Melissa*, *Thecla Acadica* and three specimens of *Thecla strigosa*, all of which showed the large fulvous spots similar to the specimen figured by Boisduval and Leconte as *T. Liparops*. This form was very rare at Ottawa, the speaker having taken only two specimens in many years.

While on his feet Mr. Fletcher said he wished to mention that a good deal of work had been done during the past season in collecting insects in distant places in Canada.

Mr. A. P. Low, of the Geological Survey, had made a collection of diurnal Lepidoptera and Coleoptera in his journey across Labrador, specimens of *Pyrgus centaureæ*, *Chionobas jutta* and *Colias Scudderii* were exhibited. Dr. G. M. Dawson and Mr. J. McEvoy had collected in the mountains about Ashcroft, B.C.; Messrs. U. de B. Green and Edmund Reynolds had made large and valuable collections of Lepidoptera in the mountains at Osoyoos, B.C., just north of the boundary of Washington State. Specimens were exhibited of *Papilio Daunus*, *Oregonia*, *Rutulus* var *Arizonaensis*, *Turnus*, *Satyris (Elyus)*, *S. Ariane*, *Lycena sagittigera*, *L. Heteronea*, *Pieris Beckerii*, *Colias Emilia*, *Anthocaris Sara*, *A. creusa*, *Thecla dumetorum*, *Pterogon Clarkiæ* and many other

rarities. Mr. Fletcher was glad to be able to announce that Mr. Green intended next year to collect as a business. His address for the present is Osoyoos, B.C., and intending purchasers would do well to correspond with him at once. Mr. Green and Mr. Reynolds had both added new species this year to the Canadian list. At Calgary Mr. C. Wolley-Dod had done good work in collecting and providing Mr. W. H. Edwards with eggs of *Chionobas Alberta*, the larvæ from which had been successfully taken through all their stages. At Olds, 40 miles from Calgary, Mr. T. N. Willing had also done good work, and had taken, among other rarities, *Erebia discoidalis* and *Argynnis Edwardsii*. Prof. John Macoun had this year collected at Crane lake, in the same district, and had added *Hipparchia Ridingsii* to the Canadian list. In Alaska collections of insects had been made by Messrs Otto Klotz and W. Ogilvey, of the Boundary Survey, as well as by some of the other members of the party. This material was chiefly diptera, coleoptera and hymenoptera. It had not as yet been worked up. In the Rocky Mountains Mr. T. E. Bean continued his studies. Through his kindness eggs had been received by the speaker of *Colias Elis*, of which bred specimens of the larvæ and imago were exhibited, *Colias nastes* and other rare species. Some beautifully blown larvæ prepared by Mr. Bean were shown. Mr. W. McInnes and Mr. J. O. Guilim, of the Geological Survey, had collected east of Port Arthur, the latter gentleman taking *Euptoieta Claudia* at Wabigoon, on the C. P. Ry. In Manitoba collections had been made by Mr. Hanham at Winnipeg, and a very remarkable collection by Mr. E. F. Heath, near Cartwright, Man., some most surprising captures had been made as *Vanessa Californica*, *Nathalis Iole*, and a *Thecla* which is probably undescribed. Mr. Heath has also sent the cocoons of some splendid specimens of *Samia Columbia* which were exhibited, and compared with specimens found at Ottawa on tamarack. The northwestern food of this species is *Elaeagnus argentea*, and the moths are always distinguishable by their much redder hue.

Mr. Harrington gave some interesting "Notes on Canadian Coleoptera," relating how he had obtained a hair snake from a *Coccinella*, and found the larvæ of a beetle, *Brachyacantha ursina*, feeding upon plant lice in an ant's nest, with other noteworthy matters, which will be found detailed in his paper.

The meeting adjourned at 6 o'clock p.m.

EVENING SESSION.

In the evening the society held a public meeting in its rooms in Victoria Hall, at which there was a largely increased attendance of members, between thirty and forty being present. Besides those already mentioned at the afternoon meeting, the following were noticed: Messrs. R. W. Rennie, J. G. Wilson, J. H. Bowman, Dr. S. Woolverton, J. H. Pearce, W. T. McClement, W. Scarrow, etc.

The chair was taken by the President, Mr. Harrington, at 8 o'clock. After apologizing for the absence of Mr. Kilman and Mr. Evans, the Chairman called upon the Secretary to read the

REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario beg to present the following report of their proceedings during the past year:

They are happy to congratulate the members of the society upon the steady increase in numbers which continues to take place, and the hearty interest that is maintained in the various departments of work.

The twenty-fourth annual report on Economic and General Entomology was presented to the Minister of Agriculture in November last, and was printed and distributed at the beginning of January. It consisted of one hundred and eleven pages, a much larger number than usual, and was illustrated with thirty-nine wood cuts and a portrait of the Editor, who was for several years President of the society. Among the more important and interesting papers may be mentioned Mr. Fletcher's account of "The Injurious

Insects of the Year 1893"; the President's Address; "Entomological Mistakes of Authors," by the Rev. T. W. Fyles; "Mosquitoes," by Mr. Moffat; "Dragon Flies," by Mr. McLaughlin; "A Contrasted Summary of the Main External Characters of Butterflies in Their Different Stages of Life," by Mr. S. H. Scudder, and a report of the fifth annual meeting of the Association of Economic Entomologists, together with a number of the principal papers.

The *Canadian Entomologist*, the monthly magazine published by the society, has been regularly issued at the beginning of each month, and completed its twenty-fifth volume in December last. It consisted of 334 pages, being the largest number yet published. Of the twenty-sixth volume eleven numbers have already been issued; the increase in the number of pages has been more than maintained, 328 having been already published. No less than fifty-two wood cuts have been used to illustrate papers, a large proportion of them being new and original. Among the many valuable and interesting papers that have been published, mention may especially be made of the series of illustrated articles on the "Coleoptera of Ontario and Quebec," by Mr. Wickham, which are intended especially to assist beginners in naming their specimens, and to lead them on to a more thorough study of the order. The list of contributors includes the names of the most eminent entomologists in North America, as well as several in Europe.

The collections of specimens belonging to the society have been increased during the past year by the addition of a number of coleoptera new to the Canadian lists by Mr. A. H. Kilman, of Ridgeway, and a collection of insects from San Domingo. Improvements are also being steadily made by the substitution of fresh specimens for those that are faded or imperfect in the cabinets.

The geological, microscopical and botanical sections of the society have held regular meetings during the past season and have done much good work, as is shown by their respective reports. It is to be regretted that the ornithological section has not been so active as in former years, but it is trusted that interest in this department will speedily be revived.

The treasurer's report is highly satisfactory. The expenditure on the *Canadian Entomologist* has necessarily been increased by its enlargement, but this has been fairly met by the steady growth in the number of subscribers and by the sale of back volumes. The balance on hand at the close of the financial year is \$360.50. This will be entirely absorbed by the necessary expenses of the remaining months of the year. The Council take this opportunity of recording their appreciation of Mr. Balkwill's services as treasurer and the satisfactory mode in which his accounts are kept.

The society was represented at the annual meeting in Ottawa of the Royal Society of Canada, in May last, by the Rev. T. W. Fyles. We have much pleasure in recording that two of our members were elected fellows, namely, our President, Mr. W. H. Harrington, and the Rev. G. W. Taylor, of Nanaimo, B.C.

All of which is respectfully submitted.

W. E. SAUNDERS,
Secretary.

REPORT OF THE LIBRARIAN AND OURATOR.

Mr. J. A. Moffat presented and read his report as follows:

I beg leave to submit my report for the year ending 31st of August, 1894.

Seventy-seven volumes have been added to the Library during the year; these include bound volumes received from public institutions and scientific societies, exchanges collected and bound, also books obtained by purchase.

The more important of the bound volumes received are, The Reports of the Missouri Botanical Garden for the years 1891 and 1893.

Annual Report of the Ontario Department of Agriculture for 1892.

The Smithsonian Report for 1891.

Report of the New York State Entomologist for the years 1891 and 1892.

Report of the New York Agricultural Experiment Station for 1892.

Reports of the New York State Museum for the years 1892 and 1893.

Proceedings and Transactions of the Royal Society of Canada for 1893.

Iron-bearing Rocks of Minnesota.

Added by purchase: A popular handbook of the Ornithology of the United States and Canada, based on Nuttall's Manual: by Montague Chamberlain, 2 volumes. All the Entomological writings, up to date, of J. W. Tutt, F. E. S., England, editor of "The Entomological Record and Journal of Variation." Also his instructive and amusing book entitled, "Random Recollections of Woodland, Fen and Hill"; seven volumes in all. These were obtained in exchange for back volumes of the *Canadian Entomologist*.

There are now four hundred and eighty-five pamphlets in the Library, bound in twenty-seven volumes. These volumes are labelled "Pamphlets," and numbered consecutively from 1 to 27, but have their number in the Register according to the time they were bound and placed in the Library. The pamphlets are numbered in order, and catalogued in a book by themselves, giving the Library number as in the Register, the number of the pamphlet volume, the pamphlet number, with the author's name, the subjects, and the date of issue where obtainable.

The whole number of volumes on the Register is now 1,361. The number of volumes issued to local members during the year was forty-four.

Additions are still being made to the Society's collection of native lepidoptera by the capture of species hitherto unrepresented therein; twenty named forms being added during the year, which had not before been published as Canadian. There are now 1,077 named forms in this department, as against 930 in 1892. A steady improvement in the quality of the collection is also being made by the replacing of such as are not in perfect condition, with fresh material obtained by capture or exchange.

The first important addition to the Society's collection of native Coleoptera for several years was made by Mr. A. H. Kilman, of Ridgeway, Ont., in a donation of a hundred and fifty species.

A small but highly interesting collection of Santo Domingo insects was presented to the Society by a friend, the captures of his sister, Miss Davida Rougoie, who is at present a resident of that island. The most noticeable feature of it being three specimens of *Mantis* of strikingly different form, color and ornamentation, indicating that it is an abundant family in that locality.

Through the kindness of Mr. A. P. Morse, of Wellesley College, Mass., the Society has been put in possession of representative specimens of three species of New England *Spharagemon*, also his paper, historical and descriptive, of the same.

All of which is respectfully submitted.

J. ALSTON MOFFAT,
Librarian and Curator.

The President then read his annual address, which was listened to with great interest and attention:

ANNUAL ADDRESS OF THE PRESIDENT.

BY W. HAGUE HARRINGTON, F.R.S.C.. OTTAWA.

“An ant slow-burrowing in the earthy gloom,
 A spider bathing in the dew at morn,
 Or a brown bee in wayward fancy borne
 From hidden bloom to bloom.”

—*Lampman.*

GENTLEMEN,—My first duty to the members of the Entomological Society is to sincerely thank them for the honor which they conferred upon me in re-electing me to be their President, notwithstanding my inability to be present with them at the last annual meeting. Those among you who may afterwards have read my address, as printed in the Annual Report, may perhaps have congratulated yourselves that I did not appear at the meeting and read it to you in extenso. You need not, however, be alarmed lest you have to listen to such an over-lengthy document on this occasion.

My good friend, Mr. Fletcher, has kindly consented to address you on the injurious insects of the past season, and thus I am relieved of a task for which he is more competent, and for which his official duties so fully qualify him. You shall, I rest assured, find his remarks to be most interesting and profitable to you, both as regards economic and scientific questions.

The Report prepared by the Council will inform you as to the work performed by the Society during the year, and as to its present financial standing and prospects, so that, with regard to these points, I need merely express my sense of a lively satisfaction in the knowledge that continued prosperity and success crown the efforts which you are making to advance an interest in, and a truer knowledge of the attractive and deeply interesting science of entomology, for the study of which you have been banded together for so many years.

After careful consideration of several topics which occurred to me as worthy of your attention, I decided that a brief review of the results of the past twenty-five years might not be unprofitable. I shall base my remarks upon the volumes of the *Canadian Entomologist*, and shall afterwards endeavor to indicate the direction in which future work may be advantageously undertaken. The splendid series of twenty-five volumes of the *Canadian Entomologist*, which have already been completed, constitute a veritable treasure-house of information regarding the insects of North America. The value of their pages has been greatly increased by the constant contributions from the leading entomologists of the neighbouring Republic, and by frequent articles from European correspondents. The valuable papers received from these sources have dealt largely with the Canadian fauna, and have often been based upon the captures of our members in Canada, but my present remarks will be confined to a discussion of the work of our home members as recorded by themselves. These laborers have ever been few in proportion to the vast extent of country of which it is our privilege and duty to investigate the insect life. We need not be surprised, therefore, because the investigated districts are very limited in comparison with the still unexplored fields which are waiting to yield up their treasures to the careful investigator. The areas in which systematic and sustained work has been done are, in fact, so few and so limited in extent, that on a map they appear almost as mere starting-points.

It is worthy of note that the labors of editing the twenty-five volumes of the *Entomologist* have devolved equally upon Prof. Saunders and Dr. Bethune; each of these gentlemen having edited twelve volumes and shared in the editing of volume eighteen. The Society has owed much to the zeal and work of these gentlemen, whose contributions appear in nearly every volume, and much exceed the efforts of any other member. Among their contributions are many valuable papers on our lepidoptera, containing descriptions of their earlier stages, and also of some new species. Another series of very interesting and valuable papers was that “On Some of our Common Insects,” designed to arouse the interest of some of those who might be taking up the study of entomology,

and to stimulate them to become earnest workers. We are glad to know that these learned friends, who have, in the past, done so much for our Society and for the study of entomology, are still connected with us in the work which we are carrying on. Dr. Bethune continues to be our efficient editor, and under his wise and careful direction our publication continues steadily to improve, and to hold a foremost place in entomological literature. Prof. Saunders, although called to a position making great demands upon his time and strength, still keeps up his interest in our special line of scientific work. A few years ago he embodied his researches in that excellent treatise on "Insects Injurious to Fruits," which, since its appearance, has been a standard work, and has had a very large circulation throughout North America.

One of the most useful and important features of the earlier volumes was the compilation by Dr. Bethune, from Kirby's *Fauna Boreali-Americana*, of the "Insects of the Northern Parts of British North America" (afterwards republished as a separate volume), which placed the descriptions of a great many of our insects in the hands of students who might not otherwise have been able to obtain them, the original publication being very rare.

Before commencing this address I made a list of some fifty Canadian contributors, the majority of whom still continue to send in valuable papers. Several, however, have passed to the "Happy Hunting Ground" beyond the "Great Divide," while others have either removed from the Dominion, or through pressure of business and new occupations, have ceased to contribute; though in some cases still keeping up their collections and their interest in the study and work of the Society. My intention is not to go at length into the writings of individual members, nor can I make any reference to the many valuable papers specially prepared for the Annual Reports furnished to the Ontario Government. But I shall try to bring my subject before you in two ways: first, from a geographical standpoint, that you may see in what districts our insects have been studied; secondly, from a systematic point of view, that you may see which orders have received attention, and which have been, in whole or in great part, neglected.

As our Society is provincial, in so far as regards its name and the liberal support which it annually receives from the enlightened Legislature of Ontario, so the larger portion of the work accomplished by it has naturally related to the insects of the Province in which it was organized and by which it is sustained. A good starting-point for our proposed tour of inspection will be London—the beautiful city in which we are now met, and which, as the headquarters of the Society, has been for many years the Entomological Mecca to which we annually resort to renew our strength and zeal in the good work, and to arrange our plan of campaign for the coming year.

Here Prof. Saunders toiled for many years, and, with the later assistance of his sons, made most extensive collections. His papers do not, however, include any lists of the species which he collected in the various orders, and the same remark may apply to Messrs. Denton, E. Baynes Reed, Williams and others whose captures have so largely enriched the collections of the Society. The London members, however, had for many years almost the entire management of affairs of the Society, and the preparation of the Annual Reports, the arrangement of the collections, the care of the library, etc., occupied much time that might otherwise have been devoted to special lines of research.

At Grimsby Mr. J. Pettit, in the earlier years of the Society, was a very skilful and assiduous collector, and his list of the coleoptera taken in that neighborhood, which he commenced in the first volume, is one of the most complete local catalogues yet published in Canada. The Hamilton district has been investigated by such competent collectors as Messrs. Moffat, Murray, Johnston and Hanham. The first of these gentlemen has made many valuable contributions to our publications, and is now continuing his good work in London, where he has the charge of the collections and library. Mr. Geo. Norman, of St. Catharines, published a very interesting list of the Noctuidæ captured there by him. At Ridgeway we find a member of our Council, Mr. A. H. Kilman, who has made extensive collections in what seems to be a very rich district; but while he has added largely to the knowledge of our insects, he has not yet published as much regarding them as we should like him to do.

Toronto, as the chief City in Ontario and the seat of various and important institutions of learning, should furnish us many capable investigators, but I find that the workers there have never been numerous; nor do the local natural history societies appear to have done much to develop them. I must mention, however, our first President, Prof. Croft, with Mr. W. Brodie and Capt. Gamble Geddes. Mr. Brodie has accumulated large collections, and he has published a few interesting articles in our magazine (and more recently in the "Biological Review of Ontario,") upon various gall-forming insects. Capt. Geddes has been a most enthusiastic gatherer of lepidoptera, amassing a collection of butterflies unequalled in Canada, and which has since been purchased by the Geological Survey of Canada. His interesting papers upon Canadian butterflies appear in several volumes of the *Entomologist*.

Port Hope has been the home of Dr. Bethune, so we may rest assured that the country round about has been well investigated. I have not yet had the pleasure of seeing his fine collections, and as regards the extent and value of his writings upon our insects I have already spoken. At Belleville we have had such well-known collectors as Prof. J. J. Bell and Prof. Macoun. The former paid much attention to the smaller forms of coleoptera, and was a frequent contributor to the *Entomologist*. As for Prof. Macoun, he is now a naturalist of world-wide reputation, who has been most assiduous in making known the fauna and flora of the Dominion, and although the great demands upon his time do not permit him to continue the study of entomology, he still continues, I am glad to say, the collection of insects as opportunity permits. In the neighboring town of Trenton very careful work has been done by Mr. J. D. Evans, one of the most thorough collectors with whom I have corresponded, and whose collections are models of neatness and skill, in mounting and arrangement.

A branch of the Society formerly existed at Kingston, but I do not find the record of any work except by Mr. R. V. Rogers, from whom we have had several interesting papers. With such a well-known university as Queen's located in the city, there should be more activity in the development of the natural history of the locality. Ottawa in the early days of the Society was the residence of one of our most noted collectors, the late Mr. B. Billings, who was a contributor to Vol. I. His collections were extensive and were very carefully and skillfully prepared, but death cut short his labors, and his collections were mostly destroyed through want of proper care on the part of the Society into whose hands they passed. Of recent years there has been an active, if not large, body of investigators, who have striven to develop a full knowledge of the local fauna, and who have been able to do some useful work in other directions. Prof. Saunders is now there, as Director of the Experimental Farms, in connection with which our good friend, Mr. Fletcher, holds the position of Entomologist and Botanist. The value and authority of his official work, and his enthusiasm in all entomological matters, are recognized by every entomologist. Your out-going President is also to be found in the Capital, when at home, but it would not be quite the correct thing to give any opinion on his work, as you might think me a prejudiced judge. The Ottawa Field-Naturalists' Club, organized in 1879, has always had an Entomological Branch, and several other of its members are doing fair work, among whom I may cite Mr. T. J. MacLaughlin, one of the few collectors of odonata in Canada. Several entomological lists, with numerous reports and papers have been published in the *Transactions* of the Club (now the *Ottawa Naturalist*), and Mr. Fletcher has now ready for publication a complete catalogue of the Ottawa butterflies.

Occasional workers have been stationed at other points, as, for instance, Rev. V. Clementi at North Druro, Mr. N. H. Cowdry at Stratford and Mr. B. Gott at Arkona. In the Lake Superior region the only sustained work has been by Mr. Evans at Sudbury, where he made a most interesting, and fairly complete, collection in several orders. Many rare insects have been captured by him and it is much to be regretted that he has not yet found time to publish the lists which he has had in preparation. Nipigon has several times been visited by Mr. Fletcher, and in one of the annual reports can be found an interesting account of the work done there. Dr. Bethune has also published observations made during a trip to Lakes Huron and Superior.

In the adjoining Province of Quebec we find the work of the Ottawa members naturally extending across the Ottawa river to a country which within a few miles is diversified by outlying spurs of the Laurentians, with some consequent change in the flora and fauna. A strong branch of our society is located in Montreal where much effective work has been done by the resident entomologists. It is only a few years since the branch sustained a great loss in the death of their former President, Mr. Bowles, who had made a study of the lepidoptera of the Island of Montreal, and had written frequent papers on the species collected. Mr. Lyman, who I am glad to see with us to-day, has for several years been the President and has shown great interest in its success, and in the continuance of its meetings. He has made a careful study of the lepidoptera, and has accumulated a splendid collection, while his contributions to the *Entomologist* have been numerous and of unusual interest. The late Mr. Caulfield was an industrious collector, and careful observer, who contributed severable valuable lists and other papers, relating chiefly to the insects of the Island of Montreal. Another member who resided there was the late Mr. W. Couper (also of Quebec and Ottawa) a frequent contributor to our earlier volumes. Among other Montreal workers may be mentioned Messrs. Jack, Winn, Hausen, Gibb, Wintle, etc. The Natural History Society has always taken some interest in entomology, and on its annual field-day encourages by suitable prizes the collection of insects by the young people. The *Canadian Naturalist and Geologist* and its successor the *Canadian Record of Science* have from time to time published entomological papers, such as the late Mr. Ritchie's list of local coleoptera, Mr. Caulfield's paper on Canadian orthoptera, and Mr. Hausen's list of coleoptera collected at St. Jerome.

Going down the St. Lawrence we reach Quebec, the scene for many years of the labors of the late Abbe Provancher, whose Faune Entomologique is a monument to his industry and perseverance in the collection and study of our insects, under more than usual difficulties and discouragements. Mr. Bowles and Mr. Hanham also formerly resided in Quebec, and at present we are well represented there by the Rev. T. W. Fyles, a very industrious observer, who has frequently charmed us by the scholarly papers read at these meetings, to be present at which he does not hesitate to take the long journey from the Ancient Capital. The late Mr. Couper made collecting trips to Anticosti and the shores of the Lower St. Lawrence, the results of which appeared in our earlier volumes.

In the Maritime Provinces our only contributors appear to have been Mrs. Caroline E. Heustis of St. John, N.B., and Mr. J. Matthew Jones of Halifax, N.S. The catalogues of the British Museum and other scattered entomological literature show that considerable collections have been made in those provinces, chiefly by officers of the army and navy, and it is matter of regret that there are no resident entomologists, to make a closer study of the insect life, which my own occasional observations prove to be very interesting in many particulars.

Turning westward again to that immense country which stretches from our fair province to the far Pacific, the localities which have been investigated are almost lost in the vast expanse of yet unexplored territory. Mr. Hanham, who formerly collected in Ottawa, Hamilton, Paris and Quebec, has recently removed to Winnipeg, and intends to devote every opportunity to making known its insect life. Capt. Geddes a few years ago made most valuable collecting trips across the prairies and to the Rocky Mountains, and at Laggan, Alta., Mr. Bean is industriously collecting, and adding to our knowledge of the mountain fauna. Both of these gentlemen have, however, devoted themselves chiefly to the study of the lepidoptera, and we have yet to wait for resident entomologists, stationed at moderate distances apart, to gain an adequate idea of the general distribution of the insects of all orders.

On the Pacific coast the Canadian gleaners are also few, although a rich and abundant insect life rewards the labors of the collector. Our chief worker has been the Rev. G. W. Taylor, who has made large collections of lepidoptera, hymenoptera and coleoptera, including many species new to science. These collections were chiefly made in the vicinity of Victoria, V.I., but Mr. Taylor has recently removed to Nanaimo, and

has thus a new field of investigation open to him. Mr. W. H. Danby of Victoria is also an energetic collector, and our former associate in the Council, Mr. E. Baynes Reed, now resides at Esquimalt, a few miles from Victoria, and although he has not yet sent to us any account of his work, I know that he is making collections. The recent organization of a Natural History Society in Victoria may stimulate a further interest in Entomology, indeed I believe that a catalogue of the butterflies of Vancouver Island has already been published in the transactions of the Society. Several hundred miles to the north, at Masset in the Queen Charlotte Islands, there is a very careful and competent collector, the Rev. J. H. Keen, who in this farthest outpost has made most interesting discoveries, especially in coleoptera.

A considerable knowledge of the insects of the remoter regions of the Dominion has resulted from the collections made by various members of the staff of the Geological Survey; prominent among whom may be mentioned Dr. Dawson, Dr. Bell and Prof. Macoun. There has not yet been any regular entomological work done in connection with the Survey, and it cannot be expected that the collections of insects, which are made in addition to the regular field work, should be very large or comprehensive. But our thanks are no less due to the gentlemen who have aided; for even a few specimens brought in occasionally, from the distant points reached by these explorers, may do much to help in ascertaining the geographical range and distribution of species. Reference to Volume XXII of the *Entomologist* will show that quite a long and useful list of coleoptera was obtained by collating the various short lists published in the Survey Reports. When the Dominion Museum is housed in correspondence with the value of its great collections, and room is afforded for the display of the natural history specimens collected, the explorers will feel a greater interest in the securing of specimens, and a department of entomology will probably soon be installed.

Having now made a rapid, and necessarily imperfect, survey of the districts which our members have explored in the past, or which they are still investigating, let us change our point of view, and, for a few moments, consider what attention has been bestowed upon the several orders, into which it has pleased systematic entomologists to separate the great and almost inexhaustible complex of minute forms, which are known to us under the general term Insects. From the twenty-five volumes of the *Entomologist*, I have made a list of the papers which seemed to me to be of most importance in helping us to a knowledge of the position of our workers in regard to the investigation of the several orders. The list (appended) is by no means a complete one, as numerous short papers, notes on the occurrence of species, and interesting correspondence have been omitted; my object not being to make an index of papers.

It is found that the contributions dealing with lepidoptera probably equal, in number and volume, those relating to all the remaining groups. This, however, is not surprising, for to this order belong the most beautiful examples of all terrestrial life; flowers of the air, their wings decked with all the hues that blossom or gem can show; as they wing their brilliant flight through the glad summer days, or hover radiantly over the fragrant blooms, they naturally appeal to every heart which is warmed by the least vestige of artistic or poetic taste. Dull and debased indeed in feeling, and most sincerely to be pitied, must he be who sees not some beauty, feels not something of inward pleasure, in beholding these wonderful atoms of grace and brightness.

“The dreamy butterflies
 With dazzling colours powdered and soft glooms,
 White, black and crimson stripes, and peacock eyes,
 Or on chance flowers sit,
 With idle effort plundering one by one,
 The nectaries of deepest throated blooms.”

—Robert Bridges.

Apart also from their beauty of form and richness of ornament in the winged state, the lepidoptera furnish the most interesting and attractive examples for the study of the development and life of the insect, from the egg to the imago. In the larval stage they also play a most important part in the economy of nature, and make man pay tribute in varied and large measure. Yet even in this favorite order there remains plenty of work

for our entomologists, and far from discouraging those who are engaged in such attractive studies, I would urge them to perfect their knowledge by careful observations on the early stages of our lepidopterous friends and foes, so that they may make their light to shine for the guidance of their fellow students.

Next to the butterflies, the beetles have ever been the favorite prey of the budding entomologist. Very numerous, varied in form and habits, yet easy to collect and preserve, they yield themselves most readily to the formation of an attractive and easily cared for collection. The coleoptera have for these reasons been so thoroughly collected in northern countries, that there remains, even in Canada, a very small percentage of species not already known to entomologists. Even microscopic species from most remote localities, with few exceptions, prove to have received a name and character—even if the character may occasionally not be a good one, or sufficient to qualify the beetle for the position in which it has been placed. Yet there remains abundance of work for our coleopterists in the more careful collecting of the smaller species, and the preparation of accurate local lists, and especially in the study of the early stages of our beetles, since the complete life history of comparatively few species is known.

“Among the yellow pumpkin blooms, that lean
Their crumpled rims beneath the heavy heat,
The striped bees in lazy labor glean
From bell to bell with golden-feathered feet.”
—*Lampman.*

Of recent years more attention has been directed to the study of the hymenoptera, and interest in these insects has been stimulated by the publication of several fine works. The publication by Cresson of a synopsis of the families and genera, and a catalogue of the described N. A. species has much facilitated the determination and arrangement of collections, but species are being so rapidly discovered and described, that a new edition will soon be necessary to make it conform to the present knowledge of the order. To our younger members, who have not yet settled upon any special line of investigation, I would strongly recommend the consideration of this order, to which my own attention has been chiefly given for several years. The species are very numerous, more so even than the beetles, and the habits of its members are of wonderful variety and interest. From the bees, wasps and ants, with their well developed mental faculties and their highly organized family communities, we pass to microscopical forms of which a score may develop in a single butterfly-egg. The study of these insects is most absorbing, and inexhaustible fields of enquiry are open. It would be very encouraging to see more students attracted to this order; taking up special families, and by sustained and serious researches aiding in the elucidation of many perplexing problems.

“Mist of grey gnats that cloud the river shore
Sweet even choruses, that dance and spin
Soft tangles in the sunset.”

—*Lampman.*

Apart from the three orders to which reference has been made, there has been but a meagre investigation of our insects, notwithstanding their claims to a due share of attention. The diptera are numerous in species and individuals, of much diversity of habit, and of great influence upon the bodily and temporal welfare of man. The order is difficult to study for the very reason that so few have devoted their attention thereto, but it affords scope for much original work, which cannot fail to be of great importance. There are probably hundreds of species now in the collections of our members waiting for some student to make them known to us.

The neuroptera and pseudoneuroptera are less rich in species, but include some of our largest and most striking insects, such as the dragon-flies.

“To-day I saw the dragon-fly
Come from the wells where he did lie.
An inner impulse rent the veil
Of his old husk; from head to tail
Came out clear plates of sapphire mail.
He dried his wings; like gauze they grew;
Thro' crofts and pastures wet with dew
A living flash of light he flew.”

—*Tennyson.*

The early stages of many forms can be advantageously studied in aquaria, for the life histories of but few of the American species have been published. Here is another inviting and almost unoccupied field for students seeking a special line of work.

The same may be said of the orthoptera, our species of which are not numerous, but of moderate size and frequently present in great abundance. They are among the most destructive insect enemies of plant life, but atone, in some measure, for their ravages, by the animation of their movements, and their almost ceaseless stridulation breaking agreeably the silence of the fields.

“ In intervals of dreams I hear
The cricket from the droughty ground ;
The grasshoppers spin into mine ear
A small innumerable sound.”

—*Lampman.*

The hemiptera consist of two very large and important groups, which contain many species exceedingly injurious to the crops which man raises, with so much labor, for his sustenance, and even from merely material motives the “bugs” are deserving of careful study. Nor are these insects all unattractive in their forms and habits; many of them, in fact, are very prettily ornamented. It is fully time that some attention was bestowed upon them by our members.

Even yet the avenues of study have not been exhausted; when all the six-footed insects have been examined there still remain for observation the spiders, skilful weavers of the silken films that glisten in the morning dew; the mites, so small and yet so grievously afflicting man and beast and plant; with other allied arthropods of considerable variety of form and habit, which fall within the scope of entomological research.

The volumes of the *Canadian Entomologist* contain many important papers by our numerous and hard-working entomological friends in the United States, upon the orders and groups which have been so much neglected by our own correspondents. These papers indicate the interest and value which is attached to their study, and in these contributions it is often observed that the species under discussion have been derived from Canadian sources. This indicates that our collectors are not working up the material that they obtain with so much care and patient searching. It is certainly easier to send specimens to specialists abroad than it is to determine them with the scanty library and cabinet resources at the command of most of us. But one should not rest satisfied merely with such determinations, but by subsequent study of his insects increase his knowledge regarding them. He will thus be able, at least, to publish correct local lists which may be of great value in the more complete study of the fauna of larger regions, and as data for establishing the distribution of species.

There is a great temptation to amass large collections, which in themselves are very desirable and important, but whose care and incident correspondence and exchange may so engross one's time that profitable lines of investigation are neglected, and one becomes merely an insect curator instead of an entomologist. The finest collection may be suddenly destroyed, or its possessor incapacitated for further labor, and the knowledge which he has accumulated by many years of patient toil is then lost to science, if it has not been published. There are rare instances of writers who seem unable to restrain themselves from any topic, but the majority of entomologists doubtless find, as I do myself, that it is far more pleasant to collect, examine and arrange their specimens than to sit down and write about them. Yet we should try to do our duty in this respect also, knowing that, if we have made discoveries or valuable observations, we owe it to our fellow-workers to make them participants therein through the pages of the *Canadian Entomologist*.

If gentlemen, you have found my paper dry, I may but hope that it has been dry enough to kindle fresh entomological fires, or add fuel to those already existing; fires that shall emit not merely flashes of passing enthusiasm, but which shall burn brightly and steadily, casting light where the shadows now deepen, and by genial warmth stimulating to renewed attack upon the myriad problems which await your solution in the almost limitless and ever-attractive domain of Insect Life.

APPENDIX A.—LIST OF FIFTY CONTRIBUTORS, WITH THE NUMBER OF VOLUMES TO WHICH THEY CONTRIBUTED

	No.		No.
Bean, Thos. E., Laggan	2	Hausen, I. F., Montreal	2
Bell, Prof. J. J., Belleville	2	Heustis, Mrs. Caroline E., St. John, N.B.	5
Bell, J. T., "	4	Jack, John G., Chateaugay Basin	5
Bethune, A. M., Port Hope	1	Johnston, James, Hamilton	1
Bethune, Rev. C. J. S., Port Hope	22	Jones, J. Matthew, Halifax	1
Billings B., Ottawa	1	Keen, Rev. J. H., Masset, B.C.	1
Bowles, G. J., Quebec, Montreal	12	Kilman, A. H., Ridgeway	3
Brodie, W., Toronto	5	Lyman, H. H., Montreal	12
Caulfield, F. B., Montreal	14	Macoun, John, Belleville	1
Clementi, Rev. V., North Douro	4	Moffat, J. Alston, Hamilton	16
Couper, W., Montreal	9	Murray, Wm., "	3
Cowdry, N. H., Stratford	1	Norman, Geo., St. Catharines	2
Croft, Prof. H., Toronto	2	Pearson, C. W., Montreal	3
Danby, W. H., Victoria	2	Pettit, J., Grimsby	5
Dawson, Percy M., Montreal	1	Provancher, Abbe, Cap Rouge	2
Denton, J. M., London	1	Reed, E. Baynes, London	13
Evans, J. D., Trenton	1	Rogers, R. V., Kingston	5
Fletcher, J., Ottawa	13	Saunders, H. S., London	1
Fyles, T. W., S. Quebec	12	" Prof. W., "	19
Geddes, Gamble, Toronto	7	" W. E., "	2
Gibb, Lachlan, Montreal	1	Taylor, Rev. G. W., Victoria	4
Gott, B., Arkona	1	White J., Edmonton, Ont.	1
Guignard, J. A., Ottawa	2	Williams, J., London	1
Hanham, A. W., Hamilton	2	Winn, A. F., Montreal	2
Harrington, W. H., Ottawa	14	Wintle, Ernest D., Montreal	1

APPENDIX B.—LIST OF CONTRIBUTIONS (NOT COMPLETE) BY THE WRITERS MENTIONED IN APPENDIX A.

Lepidoptera.

	Vol.
Entomological Notes (a series of papers), Saunders	I.
Notes on Canadian Lepidoptera (a series of papers), Bethune	I.
List of Diurnal Lepidoptera observed in the neighborhood of Ottawa, during the season of 1868, Billings	I.
Larva infesting the Parsnip (<i>Depressaria Ontariella</i> n. sp.), Bethune	II.
On a supposed new Arctian, Saunders	II.
Description of larva of <i>Catocala Polygama</i> , Guen., Reed	II.
Notes on <i>Hadena Xylinoides</i> , Saunders	II.
On the larva of <i>Thecla inornata</i> , G. R. Saunders	II.
A new species of <i>Anarta</i> , Bethune	II.
Note on <i>Amphipyra Tragoponis</i> , Bethune	II.
On the larvæ of some Lepidoptera, Saunders	II.
List of Lepidoptera taken at Quebec, Bowles	II.
Accentuated list of Canadian Lepidoptera, Reed	II.
On <i>Neonympha Eurythris</i> , Fab., Saunders	II.
Notes on Lepidopterous Larvæ (series of papers) Saunders	III.
Notes on <i>Samia Columbia</i> , Bowles	III.
Lepidoptera of Anticosti and North Shore of the St. Lawrence, Couper	IV.
Captures of Noctuidæ at St. Catharines, Ont., Norman	VII.
List of Diurnal Lepidoptera of the Island of Montreal, Caulfield	VII.

List of Sphingidæ and Zygænidæ occurring on the Island of Montreal, Caulfield.	VII.
Captures of Noctuidæ near Orillia, Norman	VIII.
List of Bombycidæ occurring on Island of Montreal, Caulfield and Pearson	IX.
Sphinx Eremitis, Fyles	XI.
Observations on <i>Limenitis Arthemis</i> , Mrs. Heustis	XV.
List of Geometridæ taken at Quebec and Montreal, Bowles	XV.
List of Diurnal Lepidoptera collected in the Northwest Territories and the Rocky Mountains, Geddes	XV.
Notes on <i>Colias Christina</i> , Lyman	XVI.
<i>Thecla Nippon</i> , Fletcher	XVI.
Remarks on the Family Bombycidæ, Bowles	XVI.
Rocky Mountain Butterflies, Geddes	XVII.
Additions to the list of Canadian Lepidoptera (a series of papers), Moffat	XVIII.
Additions to the list of Montreal Lepidoptera, Bowles	XIX.
The North American <i>Callimorphas</i> (with plate), Lyman	XIX.
Notes on the Genus <i>Argynnis</i> while alive in the Imago state, Geddes	XIX.
Notes on the Genus <i>Colias</i> , Lyman	XX.
Description of the preparatory stages of <i>Chionobas Jutta</i> , Fyles	XX.
Notes for collectors visiting the Prairies and Rocky Mountains, Geddes	XXI.
Notes on the preparatory stages of <i>Carterocephalus Mandan</i> , Fletcher	XXI.
The N. Am. <i>Callimorphas</i> —a reply to critics, Lyman	XXI.
The Mediterranean Flour Moth, Fletcher	XXII.
The Butterflies of Laggan, N. W. T., account of certain species inhabiting the Rocky Mountains in lat. 51°, 25', Bean	XXII.
Food plant of <i>Melitæa Taylori</i> , Edw. Danby	XXII.
Notes on <i>Argynnis Freya</i> , <i>Chariclea</i> and <i>Montinus</i> , Lyman	XXII.
<i>Gelechia Gallædiplopappi</i> , n. sp., Fyles	XXII.
Note on the occurrence of <i>Lepisesia Flavofasciata</i> , Barnston, Lyman	XXIII.
List of Lepidoptera taken at Little Metis, Que., Winn	XXIII.
<i>Hybernia Defoliaria</i> , Linn. in Vancouver Island, Taylor	XXIII.
Some rare Lepidoptera taken near Montreal, Winn	XXIII.
<i>Vanessa Californica</i> in Vancouver Island, Danby	XXIII.
<i>Pamphila Manitoba</i> , Scud., and its varieties, Lyman	XXIV.
Descriptions of the preparatory stages of <i>Nemeophilus Scudderi</i> , and its varieties, Lyman	XXV.
Notes on the occurrence of <i>Hepialus Thule</i> , Strecker, at Montreal, Lyman	XXV.

Coleoptera.

A luminous larva, Bethune	Vol. I.
Coleoptera taken in the neighborhood of London, Ont., during the season of 1868, Reed	I.
List of Coleoptera taken at Grimsby, Pettit	I.
Description of the Wheat Wire-worm, Pettit	IV.
Anticosti Coleoptera, 1873 (determined by Leconte), Couper	VI.
Additions to Canadian lists of Coleoptera, Harrington	XVI.
<i>Phytonomus punctatus</i> , Kilman	XVI.
List of Staphylinidæ taken at Belleville, Bell	XVII.
The Entomology of Vancouver Island. Notes on 76 species of Cicindelidæ and Carabidæ collected near Victoria, Taylor	XVII.
On <i>Physonota unipunctata</i> , Say and its supposed varieties, Caulfield	XVII.
Coleoptera at the electric light, H. S. Saunders	XIX.
Additions to the list of Canadian Coleoptera, Kilman	XXI.
On the lists on Coleoptera published by the Geological Survey of Canada, 1842-1888, Harrington	XXII.
Notes on a few Canadian Rhyncophora, Harrington	XXIII.
Some British Columbia Coleoptera, Keen	XXIII.
On the occurrence of two species of Coleoptera new to Montreal, Hausen	XXIII.

Hymenoptera.

	Vol.
The Grape seed insect, <i>Isosoma vitis</i> , n. sp., Saunders	II.
Remarks on the History and Architecture of the Wood Paper-making Wasps, Couper	II.
Notes on the Humble Bees, Bowles	XI.
The Entomology of Vancouver Island. Notes on 80 species of Hymenoptera collected near Victoria, V. I., in 1882, Taylor	XVI.
A new Tenthredinid, Provancher	XVII.
Notes on the occurrence of some species of Uroceridae, Harrington	XVII.
Additions to North American Hymenoptera, Provancher	XVIII.
Notes on Tenthredinidae, 1885, Harrington	XVIII.
Notes on Hymenoptera collected near Ottawa, Guignard	XVIII.
Oryssus Sayi, Harrington	XIX.
The Nuptials of Thalesa, Harrington	XIX.
New species of Canadian Tenthredinidae, Harrington	XXI.
Ibalia maculipennis, Haldeman, Harrington	XXI.
Tenthredinidae collected at Ottawa, 1889, Harrington	XXII.
Nematus pallidiventris, Fallen—a fresh importation, Fyles	XXIII.
Two new species of Canadian Pimplinae, Harrington	XXIII.
Canadian Galls and their occupants, Brodie	XXIV.
Notes on Zarea Americana, Fyles	XXIV.
Canadian Hymenoptera (series of papers), Harrington	XXIV.
Typhon flavifrons, n. sp., Fyles	XXV.

Diptera, Hemiptera, Neuroptera and Orthoptera.

	Vol.
List of Neuroptera (collected at Grimsby), Pettit	VI.
List of Canadian Diptera (compiled from Brit. Mus. Catalogue), Couper	IX.
Description of a dipterous parasite of <i>Phylloxera vastatrix</i> , Fyles	XIV.
List of Diptera taken in the vicinity of Montreal, Que., Caulfield	XVI.
Notes on Ceresa bubalus, Jack	XVIII.
Notes on Ant-lions, Moffat	XVIII.
List of Orthoptera taken in the vicinity of Montreal, Caulfield	XVIII.

General Papers.

	Vol.
Entomological notes during a trip to the Saguenay, Saunders	I.
Insects of the northern parts of British America compiled from Kirby's Fauna Boreali Americana, Bethune	II.
Quebec Currant Worms, Bowles	III.
Entomological notes during a trip to Lakes Huron and Superior, Bethune	III.
Hints to Fruit Growers (series of papers), Saunders	III.
On some of our Common Insects (a series of papers by Saunders, Bethune, Geddes, Rogers, etc., commenced)	V.
Entomology for Beginners (a series of papers by Saunders, Bethune, Fletcher, Harrington, etc., commenced)	XI.
Entomological notes, Jack	XVII.

A vote of thanks to Mr. Harrington for his valuable and very interesting address was moved by the Rev. Dr. Bethune, who remarked in doing so that he hoped all the members of the Society would be stimulated by the historical record their President had given them to fresh efforts in their investigations and renewed zeal in contributing their observations to the *Canadian Entomologist* and the Annual Report. Mr. Fletcher, in

seconding the motion, gave an account of the admirable work that Mr. Harrington has been doing for many years past in collecting and studying the coleoptera and hymenoptera of Ottawa and its neighborhood ; in the latter order especially he had accomplished very much, and described a number of new species. The motion was very cordially received by the meeting, and the vote of thanks was accorded with much acclamation.

The reports of the different sections of the Society were then presented and read by their respective Secretaries.

The Treasurer, J. A. Balkwill, read the following report of Receipts and Expenditure for the year ending August 31st, 1894 :

REPORT OF THE TREASURER.

RECEIPTS, 1893-4.		EXPENDITURE, 1893-4.	
Balance on hand Sept. 1st, 1893..	\$ 457 54	Printing.....	\$ 631 33
Members' fees	291 08	Report and meeting expenses....	157 70
Sales of Entomologist	73 90	Library	82 05
" pins, cork, etc.	62 79	Expense, postage, etc.....	116 82
" duplicates	5 25	Rent and fuel.....	159 97
Government grant.....	1,000 00	Insurance	28 00
Advertisements.....	13 50	Salaries	350 00
Interest	14 24	Pins, cork, etc	31 83
Total.....	\$1,918 30	Balance on hand Aug. 31st, 1894.	360 60
		Total.....	\$1,918 30

We, the Auditors of the Entomological Society of Ontario, certify that we have examined the books of the Treasurer, compared them with vouchers, and find them correct, and that the above is a true statement.

JOHN M. DENTON, }
 JAS. H. BOWMAN, } Auditors.

REPORT OF THE MONTREAL BRANCH

Mr. H. H. Lyman read the following report .

Annual Meeting of the Montreal Branch of the Entomological Society of Ontario :

The 21st annual meeting of the Montreal Branch was held at the residence of Mr. H. H. Lyman, 74 McTavish street, on Tuesday evening, May 8th, at 8 o'clock.

Members present, Messrs. H. H. Lyman, President ; J. F. Hausen, W. C. Adams, A. F. Winn. Rev. E. C. Trenholme, a former member was also present.

The President presented the following report of the Council :

21st Annual Report.

The Council beg to present the following report for the year 1893-94 :

From a variety of causes we have had less meetings than usual during the past winter, but the four that were held were well attended, and the following papers have been read :

I.—Common names for butterflies. Shall we have them? H. H. Lyman.

II.—A Trip to Gomin Swamp, Quebec. H. H. Lyman.

III.—Trypeta solidaginis and its parasites. Rev. T. W. Fyles.

One new member has been added to our roll, Mr. O. C. Hart, but the resignation of Mr. H. B. Cushing has lost us one.

The Council would urge the members to contribute more papers at the meetings, giving accounts of some of their collecting trips, or experience in raising species from the egg or larva as well as to bring more specimens with them.

The present season has opened unusually early, and there seems to be a prospect of a particularly good year for insects, and it is hoped that a lot of good work will be done by our entomologists.

The Treasurer's report showed the balance at our credit to be growing slowly.

Respectfully submitted on behalf of the Council.

(Signed),

H. H. LYMAN,
President.

The following officers were elected for the ensuing year :

President—H. H. LYMAN.

Vice-President—LACHLAN GIBB.

Secretary-Treasurer—W. C. ADAM.

Council—J. F. HAUSEN, A. F. WINN.

Mr. Winn read a paper entitled "An Hour at Hochelaga," illustrated by the specimens taken.

The meeting then adjourned.

A. F. WINN,
Secretary.

REPORT OF THE GEOLOGICAL SECTION.

Mr. President and Members :

I regret that the chairman of our section for the past year is not with us to-night. I refer to the Rev. Chas. Andras, who, you will remember, was with us a year ago at our last annual meeting, but has now gone to reside in the North West. We expected with his assistance to have presented a full and comprehensive report of the proceedings of our Society for the past season. We have had no more active member in our section than he since its organization. All his spare moments were devoted to making a collection of the minerals and fossils of this region, most of which were exhibited to the class from time to time, adding very much to the interest as well as profit, and giving us some idea of what might be obtained at our own doors. He made a very large private collection during the time he was with us. Together we visited most of the outlying towns in search of specimens for our cabinets, and have travelled on foot many a mile in these holiday outings.

Among other places we have visited St. Marys, Dorchester, Kilworth, Byron, Komoka, Kettle Point (Lake Huron), Ilderton, Thedford, Beachville and Woodstock.

Occasionally we had some of our fellow workers to bear us company and assist in our undertakings and researches.

I can only mention a few of my observations along the geological line. The work undertaken by this section has been greater and more successful than in any previous year, not only as regards the material that has been collected, but also in the interest the members have shown by regular attendance at our weekly meetings, and taking an active part in the discussions that have arisen from the objects laid before them.

We have also been favored with several interesting lectures and papers on various geological subjects as follows :

By the Rev. Prof. Andras :

I.—Earthquakes.

II.—Talk on British Coal Fields.

III.—Sketches of his North West Travels.

By Prof. J. H. Andras :

I.—Papers on Cephalapoda.

II.— " " Arcidae.

By Dr. I. G. Wilson :

I.—Paper on Silica.

II.— “ “ Glacial Drift.

By Mr. I. Goodburn :

I.—Lecture on the Six Days' Work of Creation.

By. S. Woolverton :

I.—Paper on Trilobites.

It is proposed to print some of them for circulation, or if thought worthy in the Journal of this society. Several of these addresses were given at the home of the vice-chairman, where an available collection is to be found, the better to illustrate the subject of the lecture.

Another observation perhaps worthy of mention, is the finding of a great number of Indian relics in this vicinity during the past summer. A number of mounds have been dug over and many rare specimens have been obtained of the North American Indian, notably—skinning-stones, pipes, bone needles, bones of the animals eaten by early inhabitants, in a perfect state of preservation, with pottery in great abundance.

The remains were all found in ash heaps, kitchen middens so called, showing conclusively that this was once a favorite resort and hunting-ground of a race of people that have faded away over three hundred years ago.

From this source sufficient material has already been collected to stock a department in a public museum.

S. WOOLVERTON,
Vice-Chairman.

REPORT OF THE BOTANICAL SECTION OF THE ENTOMOLOGICAL SOCIETY.

The Botanical Section beg to offer the following report for the summer of 1894.

The first meeting was held on April 21st, and from that date until September 24th regular meetings were held, except for a part of August.

At all the meetings the attendance has been fair, and a number of young business and professional men have become enthusiastic workers. The principal work undertaken was the collection, identification and recording of the phaenogamous plants of this district.

Field days in various directions were very fruitful, especially to Komoka on May 24th, when 77 species of plants were identified, all in bloom. At Mud Lake, south of Dorchester station, the beautiful and extremely sweet scented *Habenaria blephariglottis* was found abundant on July 2nd.

Probably the most important collections of the season were : *Collinsia verna*, taken by Mr. Robert Elliott near Plover Mills, London township, Middlesex, May 26th, now first recorded in Canada ; and *Utricularia resupinata*, collected by Mr. J. H. Bowman, near Bala, Muskoka, not before identified and recorded to our knowledge.

A specimen of the notorious Russian Thistle was found by Mr. Dearness, near Tilbury Centre in Kent county.

All of which is respectfully submitted.

W. F. McCLEMENT,
Secretary.

REPORT FROM THE ENTOMOLOGICAL SOCIETY TO THE ROYAL SOCIETY OF CANADA.

BY REV. THOMAS W. FYLES, F. L. S., DELEGATE.

I have the honor to report that the Entomological Society of Ontario continues, with zeal and success, its researches into all such subjects as naturally fall under, or in any way have a bearing upon Scientific and Economic Entomology.

The membership of the Society during the past year has greatly increased, especially by additions from the Province of Ontario. This fact betokens both a growing interest in the subject of entomology, and also an increasing confidence in the Society as a guide and helper in its pursuit.

The Society was established in 1863. Of its founders but few now remain; most of them have been lost to us through death, or departure to distant places of residence. By the members of the present day their memory is held in grateful respect. The Society, however, still enjoys the benefit of the experience and scholarship of the Rev. C. J. S. Bethune, and the business talent of Mr. J. M. Denton. The names of these gentlemen appeared in the first list of officers published by the Society, and they are found also in the list published for the present year.

The Society enjoys the confidence of the many able entomologists who have been appointed to positions in the colleges and experimental stations of the United States of America; and numerous articles from these gentlemen have appeared in the Society's publications. It also numbers among its correspondents leading entomologists in England and Germany.

It is largely due to the wise and liberal support of the Ontario Government that the Society has been enabled to attain its present eminent position of usefulness.

The report of Mr. J. A. Balkwill, Treasurer of the Society, shows that its finances are in a highly satisfactory state—all expenses having been met, important purchases for increasing the advantages of the Society having been made, and a sufficient balance remaining for carrying on the immediate work of the Society.

Seventy volumes have been added to the Society's library in the course of the year, by donation and purchase. Among them are: the "Tenth Volume of the Proceedings and Transactions of the Royal Society of Canada," "The Report of the Ontario Game and Fish Commission," "The Report of the Smithsonian Institution," "The Report of the New York State Museum," "The Mammals of Minnesota," "The Hawks and Owls of the United States," "The Seventeenth Report of the Geology and Natural History of Indiana." The number of books in the library is now 1,284. Very important additions have also been made to the Society's collections of natural objects.

Valuable work has been done by the Ornithological, the Botanical, the Microscopical and the Geological Sections of the Society, and a report from each of them was read at the annual meeting. With a view to bringing the knowledge and experience of the members of these sections to bear more frequently for the good of the Society at large, a Committee on Field Days, consisting of Dr. Woolverton, Messrs. McClement, Elliott and Stevenson, and one representative from each section, was appointed at the annual meeting.

The Montreal Branch of the Society held eight meetings during the year, at which interesting papers were read, and much profitable conversation upon entomological subjects generally was held. The branch numbers among its members men well acquainted with the entomology of the Montreal Island: Messrs. L. Gibb, A. F. Winn, F. Hausen and H. B. Cushing; and the hospitality of Mr. H. H. Lyman, the president of the branch, and the access he has afforded to his extensive collections of lepidoptera have made the meetings of the branch exceedingly pleasant and profitable.

The Annual Report of the Society, printed by order of the Legislative Assembly of Ontario, contains: a record of the proceedings of the annual meeting held October 11th

and 12th; reports from the council and the various officers and sections of the Society; the opening address of Mr. James Fletcher (given in the absence of the president), and telling of the injurious insects of the year and the various modes of dealing with them; and the annual address of the president, Mr. W. Hague Harrington, likewise containing much valuable information on these subjects. These are followed by contributions from members of the Society, viz.:

- "The Entomological Mistakes of Authors," by Rev. Thomas W. Fyles, South Quebec.
- "The Season of 1893," by the same.
- "Mosquitoes," by J. Alston Moffatt, London, Ont.
- "Canadian Uroceridae," by W. Hague Harrington, Ottawa.
- "Additional Notes on Japanese Insects," by the same.
- "Notes and Queries," by Rev. W. J. Holland, Ph. D., Allegheny, Pa.
- "The Dragon Fly," by T. J. MacLaughlin, Ottawa.
- "The Song of Thyreonotus," by William T. Davis, Staten Island, N.Y.
- "Notes on some of the more important Entomological Exhibits at the Chicago Exhibition," by James Fletcher, Ottawa.

Then comes a full report of the annual meeting of the Association of Economic Entomologists, furnished by Mr. L. O. Howard, of the Division of Entomology, Department of Agriculture, Washington, D.C., together with some of the most generally interesting papers read at the meeting. Some of these are by the most eminent and practical entomologists of the United States, and all of them are valuable. The closing pages of the report are devoted to book notices, obituaries, etc.

The *Canadian Entomologist*, the Society's monthly organ, completed at the end of the year its 25th volume. This volume contains descriptions of no less than 162 new species of insects. The contributors to its pages number 56. Among them are men of world-wide reputation.

That the Society may be of service to the community at large, by teaching our farmers, gardeners and fruit growers the life histories of their insect friends and insect foes, and by showing them how the injurious attacks of the latter are carried on, and what steps should be taken to meet and nullify them is, we believe, the earnest desire of every one of its numerous members.

Appended will be found a list of the officers of the Society.

The whole is respectfully submitted.

THOMAS W. FYLES, F.L.S., Delegate.

ELECTION OF OFFICERS.

The following gentlemen were elected officers for the ensuing year:

President—W. HAGUE HARRINGTON, F.R.S.C., Ottawa.

Vice-President—J. DEARNESS, London.

Secretary—W. E. SAUNDERS, London.

Treasurer—J. A. BALKWILL, London.

Directors—Division 1, JAMES FLETCHER, F.L.S., F.R.S.C., Ottawa.

Division 2, REV. C. J. S. BETHUNE, F.R.S.C., Port Hope.

Division 3, GAMBLE GEDDES, Toronto.

Division 4, A. H. KILMAN, Ridgeway.

Division 5, R. W. RENNIE, London.

Librarian and Curator—J. ALSTON MOFFATT, 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 and J. H. BOWMAN, London.

Delegate to the Royal Society—REV. T. W. FYLES, South Quebec.

Committee on Field Days—DR. WOOLVERTON, MESSRS. McCLEMENT, ELLIOTT and STEVENSON, London.

Auditors—J. H. BOWMAN and J. M. DENTON, London.

Dr. Woolverton exhibited a very perfect and beautiful trilobite, *Phacops bufo*, from the Devonian rocks in the neighborhood, and made some interesting remarks upon the geology of the district.

Mr. Bowman made a verbal report upon the proceedings of the Microscopical Section during the past season.

Mr. W. Scarrow suggested that the Council should be instructed to find more suitable quarters for the Society, as the present room was entirely inadequate for the purpose. The matter was discussed at some length by several of the members, and it was finally decided that the officers of the Society resident in London should be empowered to look for satisfactory accommodation, and take whatever steps might be necessary to secure it.

A very entertaining and interesting paper was then read by the Rev. T. W. Fyles on "Food, Feeders and Fed," which was highly appreciated by the audience.

The meeting adjourned at 10.30 p.m.

THURSDAY, NOVEMBER 8TH.

MORNING SESSION.

The meeting was called to order by the President at 10 o'clock a.m.

The first paper read was by Mr. H. A. Stevenson describing an attack by the moth, *Ephestia interpunctella*, in a warehouse in London, and the successful manner in which it had been dealt with.

Dr. Bethune then read an interesting paper on "The Economic Value of Parasitism," by Prof. F. M. Webster, of Wooster, Ohio. Mr. Harrington, in commenting on the paper, stated that the canker worms which had been so injuriously abundant about Ottawa for two or three years, were this season almost exterminated by their parasites.

Mr. Moffat presented papers on "A re-appearance of *Pieris Protodice*," and "Remarks on the Structure of the Undeveloped Wings of the Saturniadae."

A paper by Prof. L. R. Jones, of the Agricultural Experiment Station at Burlington, Vermont, on "Bordeaux Mixture as a Deterrent Against Flea-beetles," was presented by Mr. Fletcher.

[All the papers read at the different sessions are printed *in extenso* in the following pages of this Report.]

Resolutions regarding the binding of periodicals and the case of members in arrears with their subscriptions, were brought forward and discussed, and action taken upon them.

The remainder of the morning was spent in examining and determining specimens which had been brought to the meeting by various members. At twelve o'clock the proceedings were brought to a close, all who had taken part in them having much enjoyed their annual gathering and the many interesting papers brought before them.

INSECTS COLLECTED IN BERMUDA DURING THE WINTER OF 1894.

BY GAMBLE GEDDES, TORONTO.

The paper I propose to read before the members of the Society, will not, I fear, treat especially upon insects, for I have experienced great difficulty in securing the names of many of the species captured by me in Bermuda during the four months of last winter beginning in January. I can, however, place a number of examples before you for inspection, which may prove interesting in that they correspond so closely to many of our Canadian insects.

I shall, in the course of the paper, touch upon a few of the food-plants which came under my notice and read a list of the insects named in the only book that I could find on the subject in the Public Library. This list will not, I can assure you, occupy much of your time, as it was published thirty years ago, and very little collecting has been done since.

In considering the diurnal lepidoptera of the Islands, I shall begin first with *Danaïs Archippus*, which species was flying about freely in February and March. I fancy it must be an all-the-year-round insect as I took eggs and larvæ upon a lovely asclepias (*A. Curassavica*) at the same time that I captured apparently perfect imagos.

Of this asclepias I have raised from seed several healthy plants, and was in hopes that I could produce one in bloom.

Mr. Oswald A. Reade, (now a pharmaceutical chemist in London, England), has made his mark as a botanist in Bermuda and elsewhere, and has written a book entitled, "Plants of Bermuda, or Somer's Islands."

In his description of this asclepias (or Butterfly weed) he states that it is a perennial plant, growing from two to four feet high, half shrubby at the base, the stems being cylindrical and downy. The pods are ovate, smooth and seeds embedded in glossy, silky hairs. Distribution, West Indies. Habitat, waste places. He also says flowers showy, scarlet and orange, frequent, July to November.

I presume when he states those particular months he means that these plants are in their "prime" at this time of the year, for I found full grown larvæ, and also, very diminutive larvæ, also eggs, upon asclepias during the months of February and March.

I did not find any of the larvæ on the other asclepias, viz., *A. Linaria*.

The commonest and only other diurnal I captured was *Junonia Cœnia*, and the larvæ of this insect fed freely upon the leaves of the common sage bush, (*Lantana Odorata*.) This shrub forms the principal undergrowth of all the Islands from one end to the other of the group. It has been grown to great perfection in many of our hothouses.

J. Cœnia in its flight reminds me very much of the *Vanessidæ* and is quite difficult to catch on a sunny day, but easy to net in damp and foggy weather.

These two species are the only ones taken in winter, but a list was printed in "The Naturalist in Bermuda," by Jno. Matthew Jones and Major Wedderburn, (late 42nd Highlanders) and J. L. Hurdis, Esq., in 1863—thirty-one years ago—which reads as follows :

Danaïs Archippus	Food plant, asclepias, common.
do. Berenice	do. rare.
Vanessa Atalanta	April to November.
Cynthia Cardui	Early November, abundant 1852.
Vanessa Antiopa	Rare.
Junonia Cœnia	Called Musk Butterfly, common.
Terias Lisa	September, October and November.
Unknown (1853, September)	Brimstone yellow, tinged with a greenish hue large as English Brimstone Butterfly, taken on potato patches.

These eight varieties of butterflies appear to be all known at that time whilst none of the Skippers or Lycaenidæ appear to have been captured. This seems a curious fact as it is well known that both families are abundantly represented in the southern States and in all the West Indian Islands.

Sphinx (*Phlegethontius*) *Cingulata* is very common in season, the larva is taken on the Papaw (*Asimina Triloba*) has a thick caudal horn and pupates in the ground as most of the Sphingidæ do. (See Grote's check list of the Hawk moths of North America.)

The other *Sphinx* taken by myself was *Chorocampa* (*Deilonche*, Grote) *Tersa*. Larva feeds on Button-weed (*Spermacoce Glabra*.) Mr. Grote, in his remarks upon this insect says, rare in Canada and Eastern States, more common in the south; it has at least two congeners: *Deilonche Robinsonii* (Grote) in Cuba, and *D. Falco* (Walker) in Mexico; comparative studies must be made with other forms referred by Butler to *Chorocampa*, a genus with European types.

I was also informed in Bermuda that *D. Lineata* had been taken, but I saw no traces of it in the few collections I came across, nor did I take a specimen myself.

I now come to the most interesting part of the collection I made, viz.: the various families of moths outside of the Sphingidæ. I am indebted to Mr. Moffat for his kindness in naming a few that are identical with the Canadian species. I was unfortunate in not meeting Mr. Neumogen, of New York, on my way back, as in these matters he has always been most willing to assist me.

I am not aware of seeing any specimens in the following families, viz.: *Ægeriada*, *Thyridæ*, *Zygaenidæ*, *Bombycidæ*; but of *Noctuidæ*, *Geometridæ*, *Pyralidæ* and *Tortricidæ* there is evidently a large field open for collectors even in the winter months. In the *Noctuidæ* the *Drasterias* and *Plusias* largely predominate and the undetermined species which I have with me will clearly indicate what a wealth of them exists on these islands.

I shall endeavor to get a correct list of all the *Noctuids*, as well as the other groups, and give a list of those which have occurred in Canada, that are identical with the Bermudian insects. This list I should be pleased to have published in the "Entomologist" for future reference by those who may be interested.

In *Pyralidæ* I have taken in numbers, *Eudiotis hyalinata* of Linneus, *Nomophila noctuella*, *Botis adipaloides* and many others not yet identified.

The majority of these moths have been taken in the bright sunshine, mostly during the time of day known in Bermuda as "between the showers" and rarely at dusk.

The favorite flower of the *Plusias* was *Sinapis nigra* in appearance like a white mustard flower; also a species of Golden Rod, (*Solidago sempervirens*.)

I have also taken a number of *Pyralidæ* on the common "Sowthistle," (*Sonchus Oloraceus*) and a few *Coleoptera* on the same plant.

A few of the micros appeared to gather their food from a beautiful little plant resembling a dicentra, viz.: *Fumaria Deusiflora*; and *Parthenium Hysterophorus*, a bunch aster, was full of all kinds of insects.

Upon the vetch (*Vicia Saliva* I think) I took numerous *Hymenoptera*, notably the Bermuda wasp, *Polistes pallipes*.

Upon the flower of the orange Lantana, (*L. Cræcea*,) most of the *Diptera* were caught, and this lovely shrub grows everywhere, so freely that one was seldom at a loss to look for a bush of it.

Coleoptera. Very few *Coleoptera* are known in Bermuda, as far as I can ascertain, my total catch for over three months being 15 specimens—6 of which evidently are one species taken from the centre of full-blown roses.

Of *Diptera* I took about 50 specimens, including our own pet housefly. This was by no means uncommon during winter as the domestics had to drive them out of the rooms two or three times a day in fine weather and keep the house quite dark. Another favorite, (the mosquito,) was only too common, and for variety in size and the nature of

its bite, I consider them unequalled. These unwelcome intruders kept me so continually busy in looking after my own interests that I came to the conclusion I would not study their food plants—nor would I recommend them to any of my Bermudian friends as a “beneficial insect” (to mankind at least.)

Of Hemiptera about 6 varieties were captured, principally about the Loquat tree and upon the tree known as The Pride of India.

The Loquat is a favorite fruit with not only the natives but nearly every visitor who tastes it. The botanical name is *Cydonia Japonica*, and as its name implies is a native of Japan, and thrives in sheltered places.

The Pride of India, (*Melia Azedarach*) is a grand tree and lines the boulevards of the principal streets in Hamilton. I have water-color sketches of these trees, one in fruit the other in flower.

There is one other fruit tree the product of which seems most palatable to the natives, viz.: The Surinam Cherry. I am at fault about the scientific name, but also produce a water-color sketch of the fruit at its best. Upon the blossoms the Plusiæ and bees are to be taken, frequently in February and March. I have no doubt in the summer months the second crop would attract many more examples, for the trees fruit twice a year, I have been told by old residents.

Referring to this tree I have taken a few katydids and grasshoppers, (Orthoptera,) amongst them doubtless *Conocephalus Ensiger*, although I must confess I prefer the song of his green colored cousin *Phylloptera Oblongifolia*, hailing from our midst and which is found drowned so often on the shores of our lakes in Upper Canada after a heavy gale of wind.

The spiders would give entertainment to any enthusiast for months, for their name is legion.

In conclusion I may add that the Neuroptera were very scarce during the winter-time, although I saw several varieties in some of the local collections which were unnamed. Evidently they were abundant about the marshes during the summer months.

COMMON NAMES FOR BUTTERFLIES.—SHALL WE HAVE THEM?

By H. H. LYMAN, MONTREAL.

Read before the Montreal Branch 14th November, 1893.

This is a question upon which the entomologists of this continent have been as much divided as upon any of the deeper scientific problems which have engaged their attention.

The great majority of the working entomologists have been strongly opposed to their introduction, some even fiercely so, but there have been a few entomologists, some of them of the first rank, who have espoused their cause with at least some measure of success.

Of course there are many objections to these names, the chief being their purely arbitrary and unscientific application, the impossibility of securing uniformity in their use and the difficulty of obtaining suitable and sufficiently concise names for more than a very limited fauna.

The opponents of popular names assert that it should be as easy to remember the scientific as the common names and that if it is not, we should not encourage laziness by adopting them.

I used to be as strongly opposed to these names as anyone, but latterly have sometimes thought that if their adoption would result in popularizing the study of this science the gain would be worth the sacrifice.

In this paper, therefore, I propose to discuss this subject which has recently been brought again into view by Mrs. Slosson's interesting paper in the first number of the journal of the New York Entomological Society, and shall try to do so in a calm and judicial manner. Of course Mrs. Slosson would not suggest that the names which commend themselves to her proteges should be generally adopted, but why should we not have common names scientifically applied?

It is all very well to say that it should be as easy to remember the scientific as the popular name, but it isn't. It ought to be, of course, just as it ought to be just as easy for children to be good as to be naughty.

I have often been asked the name of a moth and when I had given it, it has been greeted with a laugh of derision, for the general public scoff at these scientific names, and one doesn't wonder when one looks over a catalogue and sees the terrible names, such as *nezahualcoyotl*, which have been given to beautiful and inoffensive creatures.

It does not degrade Botany to have the *Cypripedium* called the Lady's Slipper, the *Ranunculus* the Buttercup, or *Lonicera* the Honeysuckle, nor does Ornithology suffer because *Hirundo Horreorum* is better known as the Barn Swallow, and *Tyrannus Carolinensis* as the Kingbird, and why should there be an outcry at calling the lovely *Idalia* the Regal Fritillary, or *Grapta Gracilis* the Hoary Comma?

I believe that if we could have common names for our butterflies and a cheap, but good, book with a recognizable colored illustration of each species, such as England has in Coleman's British Butterflies, we should have at least ten persons interested in entomology for every one that we have to day.

If it be urged that it is impossible to secure absolute uniformity in the use of these names the same is true of the scientific names, as we all have to remember in reading Mr. Scudder's works that what he calls *Jasoniades Glaucus* is what the rest of us call *Papilio Turnus*.

It seems to me that one of the chief objections to the adoption of these popular names is their arbitrary application totally regardless of scientific relationship. For instance, they have in England two butterflies, known respectively as the White Admiral and the Red Admiral. Naturally one would suppose that these belonged to the same genus, instead of which they belong to entirely distinct genera, which in Kirby's world-wide catalogue are separated by fifty-seven other genera, while on the other hand the nearest ally in England of the Red Admiral is called the Painted Lady, which is surely an opprobrious name.

When I began collecting as a child, upwards of thirty years ago, and wanted to know the names of my treasures, I was told that *Cardui* was the Thistle butterfly. Shortly afterwards I captured a specimen of *Atalanta*, and fairly gloating over the pre-eminent beauty of its under surface I named it the Queen Thistle, for child though I was, I at once recognized its close relationship to the other. But in the common names which have been proposed by various authors, the generic relationship has frequently been lost sight of. A very marked example of this occurs among Scudder's names in two cases adopted from Gosse, for some of the *Pierinæ*; thus *Eubule* is the Cloudless Sulphur; *Philodice* is the Clouded Sulphur; *Lisa* is the Little Sulphur. Then in the genus *Argynnis*, *Atlantis* is the Mountain Silver Spot while *Aphrodite* is the Silver Spot Fritillary, the latter certainly a most indefinite name considering the number of silver spot fritillaries we have on this continent. On the other hand some of Gosse's names were so well chosen that we can recognize the species intended even when linked to wrong scientific names. This is strikingly the case in the *Graptas*, for which his names were particularly appropriate and have in all but one case been adopted by Scudder.

The Violet Tip was his name for *Interrogationis*; the Green Comma, though doubtfully linked with the name *Progne*, must have been intended for *Faunus*, not at that time described, while the Orange Comma and the Gray Comma well indicate *G. Comma* and *G. Progne*. It is doubtless true that in English works the popular name is frequently given undue prominence, being printed in large type at the beginning of a description,

while the scientific name is given in italics, or in brackets at the end of the description, and the same prominence was, I found, given to popular names in the beautiful economic exhibit from the Entomological Division of the Department of Agriculture in the U. S. Government building at the World's Fair; but it is not necessary to follow this custom, and we could very well print the scientific name first in large type and the popular name second in smaller type as is done by Mr. Scudder in his "Butterflies of New England."

But if it be agreed that the adoption of popular names is on the whole desirable, is it practicable? No doubt it is for a limited fauna like that of England or New England, but is it for the whole of North America?

Who will undertake to invent suitable popular names for the upwards of sixty species of *Argynnis*, the nearly forty species of *Melitæa*, the fifty species of *Thecla*, the equal number of species of *Lycaena*, or the upwards of ninety species now grouped under the generic name *Pamphila*?

I confess the idea appears to me utterly hopeless and impracticable.

THE BUTTERFLIES OF THE EASTERN PROVINCES OF CANADA.

BY REV. C. J. S. BETHUNE, PORT HOPE, ONTARIO.

The following list of the butterflies of the Eastern Provinces of Canada has been prepared in order to bring together in convenient form all the localities that have been published as well as those that have come under my own observation. The list is as complete as I can at present make it, but no doubt there are many collectors in different parts of the country who could add largely to the localities given, and possibly add a few more species to those here recorded. The time of flight and the food-plants are given in most instances.

The question of nomenclature and arrangement has been a difficult one to decide. It will be observed that I have followed the order of families and genera given in Dr. J. B. Smith's "List of Lepidoptera of Boreal America," (Philadelphia, 1891), and have for the most part adopted the nomenclature of Mr. W. H. Edwards's "Revised Catalogue of the Diurnal Lepidoptera of America North of Mexico," (Philadelphia, 1884). For the sake of convenience I have added in brackets Mr. Scudder's name for the species whenever it differs from that which I have employed. I have also followed Mr. Edwards in beginning the specific names with a capital letter as they are nearly all proper names and seldom adjectives.

In the preparation of this list the records of the following authors and observers have been gone over for localities in the Province of Ontario: Messrs. D. W. Beadle, St. Catharines; J. M. Denton, London; J. D. Evans, Sudbury; G. Geddes, Toronto; Rev. W. Kirby, ("Fauna Boreali-Americana: Insecta"); Theodore L. Mead, Oviedo, Florida; Prof. J. Macoun, Geological Survey of Canada, Ottawa; J. Alston Moffat, London; J. Pettit, Grimsby; E. Baynes Reed, London. For both the provinces of Ontario and Quebec: Messrs. B. Billings, Ottawa; W. H. Edwards ("Butterflies of North America, etc."); J. Fletcher, Ottawa; Prof. W. Saunders, Ottawa; S. H. Scudder ("Butterflies of the New England States and Canada"). For the Province of Quebec alone: Dr. R. Bell, Geological Survey of Canada, Ottawa; J. G. Bowles, Montreal; F. B. Caulfield, Montreal; W. Couper, Montreal; W. S. M. D'Urban, Montreal; Rev. T. W. Fyles, South Quebec; P. H. Gosse, Compton, ("Canadian Naturalist"); J. G. Jack, Chateauguay Basin; H. H. Lyman, Montreal; A. F. Winn, Montreal. For Nova Scotia and New Brunswick: Mrs. Heustis, St. John; J. Matthew Jones, Halifax. For Newfoundland: Capt. Brown and Mr. P. H. Gosse. For Labrador and Hudson Strait: W. Couper and Lieut. Payne. For Prince Edward Island: Prof. John Macoun.

LEPIDOPTERA.

RHOPALOCERA.

Family NYMPHALIDÆ.

Sub-family *Euploeinæ*.

1. *DANAIS ARCHIPPUS*, *Fabr.* (*Anosia plexippus*). Abundant throughout Southern and Eastern Ontario; taken also on the shores of Georgian bay, at Sault Ste. Marie and Nepigon; rare in the Province of Quebec, taken at Montreal, Sorel, Quebec, River Rouge district, Little Metis; rare in Nova Scotia. Earliest dates, May 24, June 4, 6, 7, 12, 14; very common in July; especially abundant in August and September; latest dates, October 23, 27. Food plant, *Asclepias*. Fig. 1, represents the butterfly; Fig. 2, the caterpillar; Fig. 3, the successive changes to chrysalis; Fig. 4, the chrysalis.



Fig. 1.

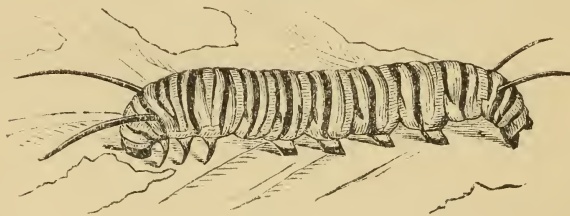


Fig. 2.

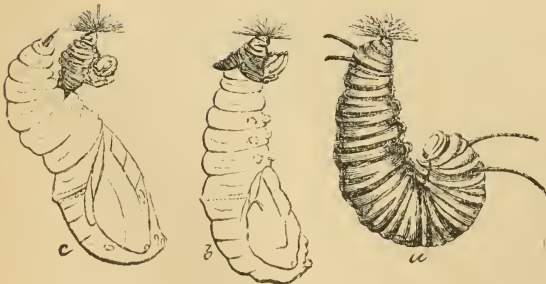


Fig. 3.

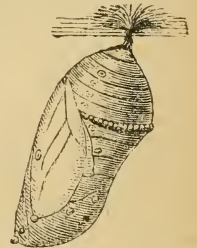


Fig. 4.

Sub-family *Nymphalinae*.

2. *EUPTOIETA CLAUDIA*, *Cram.* Very rare. Has been taken at Wabigoon, Ont. (*J. C. Guillin*), London, St. Catharines, Chateauguay Basin, Montreal (Aug. 15, 1874); also in Manitoba and North-West Territories. Food plants—Violet, Passion Flower, *Sedum*, *Portulaca*, *Desmodium*, *Podophyllum*.

3. ARGYNNIS CYBELE, *Fabr.* Common throughout Ontario and Quebec. Taken at Nepigon, Sault Ste. Marie, Georgian bay, Cameron lake, Amherstburg, Point Pelee, London, West Flamboro', Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa; Montreal, Eastern Townships, Quebec, Little Metis; also in Cape Breton and Prince Edward Island. Flies during July, August and September. Food plant of this and the other species of *Argynnis* is the various species of Violets.

4. ARGYNNIS APHRODITE, *Fabr.* Taken throughout Ontario and Quebec. Nepigon, Sault Ste. Marie, north of Lake Huron, Sudbury, Cameron lake, London, Hamilton, West Flamboro', Credit, Toronto, Cobourg, Ottawa; Montreal, Sorel, Quebec, Lower St. Lawrence and Bay of Chaleur; Restigouche river, New Brunswick; Nova Scotia; Prince Edward Island; Moose Factory, James's bay. Flies during July and August.

5. ARGYNNIS ATLANTIS, *Edw.* Common throughout Northern Ontario and Eastern Quebec. Moose Factory, Nepigon, Fort William, Sault Ste. Marie, Ottawa (rare); Montreal (very rare), Co. Missisquoi, P. Q., Little Metis, Godbout river, Cacouna, Lower St. Lawrence; Anticosti, Labrador, New Brunswick, Nova Scotia, Cape Breton, Newfoundland, Prince Edward Island. Flies during July and August.

6. ARGYNNIS ELECTA, *Edw.* Nepigon (Macoun, Fletcher, Bethune).

7. ARGYNNIS CIPRIS, *Edw.* Nepigon (Bethune and Fletcher). Sudbury (Fletcher and Evans), August.

8. ARGYNNIS MYRINA, *Cram.* (*Brenthis Myrina*). Common throughout the eastern Provinces of Canada. Nepigon, Fort William, Sault Ste. Marie, Sudbury, London, Hamilton, St. Catharines, Grimsby, Credit, Toronto, Cobourg, Rice lake, Ottawa; Montreal, River Rouge district, Eastern Townships, Quebec, Cacouna, Little Metis, Godbout river, Lower St. Lawrence; Metapedia river, Dalhousie, N.B., Nova Scotia, Cape Breton, Prince Edward Island. Flies during June, July and August. Taken at Montreal in May and at Ottawa in September.

9. ARGYNNIS CHARICLEA, *Ochs.* (*Brenthis Chariclea*). Port Arthur, Spanish river, Nepigon, Georgian bay (Lyman), July. Labrador, May 30 and June (Couper). Mingan, July 22. Hudson bay.

10. ARGYNNIS FREIJA, *Thunb.* (*Brenthis Freija*). Port Arthur, Fort William; Quebec, Gomin Swamp; Labrador, Hudson's straits, Cumberland House, Lat. 54° (Kirby), taken in August and September.

11. ARGYNNIS BELLONA, *Fabr.* (*Brenthis Bellona*). Common in Ontario and Quebec. Nepigon, Fort William, Sudbury, London, Credit, Hamilton, Cobourg, Ottawa Lake Temiscamingue, P. Q., Chateauguay Basin, River Rouge district, Quebec, Little Metis, Godbout river, Lower St. Lawrence, Dalhousie, N. B., Moose Factory. Flies in June, July, and August.

12. ARGYNNIS TRICLARIS, *Hüb.* Ottawa, Mer Bleue (June 16, 1893); Labrador (Couper, Low).

13. MELITEA PHAETON, *Drury.* (*Euphydryas Phaeton*). Widely distributed, but rarely seen. Flies only about swamps and the damp margins of rivers. Has been taken at Ottawa, London, Toronto, Montreal, Quebec, Nova Scotia, New Brunswick. Flies during the latter part of June and first half of July. Food plants—*Chelone glabra*, *Lonicera* and *Viburnum*.

14. MELITEA HARRISII, *Scud.* (*Cinclidia Harrisii*). Very rare, though widely distributed. Sudbury, Montreal, Quebec, St. Henri, Levis, Saguenay, Gaspé; New Brunswick, Nova Scotia, Newfoundland. Taken at the end of June and up to the middle of July. Food plants—Double-bristled Aster, *Diplopappus umbellatus*.

15. PHYCIODES NYCTEIS, *Doubl.-Hew.* (*Charidryas Nycteis*). Taken throughout Ontario and in Quebec; not common. Nepigon, Port Arthur, Sault Ste. Marie, Sudbury, London, Hamilton, Toronto, Ottawa; Montreal, Quebec, Saguenay. Flies in June and July. Food plants—*Helianthus* (Sunflower), *Actinomeris*.

16. *PHYCIODES CARLOTA*, *Reak.*¹ Very rare. Taken at London, (Saunders), Scarborough near Toronto, (Geddes); Nova Scotia, (Jones) "South of Lat. 40° from Atlantic to Rocky Mountains," Scudder.

17. *PHYCIODES BATESII*, *Reak.* Only recorded from Hamilton (Johnson) and Godbout river, P. Q. "Common in July."

18. *PHYCIODES THAROS*, *Drury.* (Forms *MARCIA*, *Edw.*; *MORPHEUS*, *Fabr.*) Abundant throughout Ontario, Quebec and the Maritime Provinces. Nepigon, Port Arthur, Sault Ste. Marie, Sudbury, Amherstburg, County of Essex, Point Pelee, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Rice lake, Ottawa; Montreal, River Rouge district, Eastern Townships, Quebec, Cacouna, Saguenay, Little Metis, Lower St. Lawrence, Anticosti, Labrador, New Brunswick, Nova Scotia, Cape Breton, Prince Edward Island, Newfoundland, Moose Factory. Flies during June, July and August; occasionally seen in May and September. Food plants—*Chelone glabra*, *Aster*, *Actinomeris helianthoides*.

19. *GRAPTA INTERROGATIONIS*, *Fabr.* (*Polygonia Interrogationis*). Taken throughout Ontario; rare in Quebec and Nova Scotia. Sault Ste. Marie, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa; Montreal, Compton, Quebec. Form *UMBROSA*, *Lint.* taken June 3 to 20, July 17, August 7. Form *FABRICII*, *Edw.* taken in August and September, occasionally in October. Food plants—Hop, Elm, Nettle, Linden, *Celtis occidentalis*.

20. *GRAPTA COMMA*, *Harr.* (Summer form *DRYAS*, *Edw.*; Winter form, *HARRISII*, *Edw.* *Polygonia Comma*). Common throughout Ontario; taken also in Quebec and Nova Scotia. Nepigon, Cameron lake, London, Hamilton, Port Hope, Cobourg, Ottawa; Montreal, Chateauguay Basin, River Rouge district, Compton, Quebec, Anticosti; Moose Factory; Dalhousie, N.B. June, July and August. Food plant—Hop, Elm, Nettle.

21. *GRAPTA SATYRUS*, *Edw.* (*MARSYAS*, *Edw.*; *Polygonia Satyrus*). Very rare. Taken in Ontario at Cameron lake, near London, and at Ottawa. In Quebec at Chateauguay Basin and Brome. Also in Prince Edward Island. Food plant—Nettle.

22. *GRAPTA FAUNUS*, *Edw.* (*Polygonia Faunus*). Taken throughout the Eastern Provinces of Canada. Nepigon, North of Lake Huron, Hamilton, Cobourg, Ottawa; Montreal, Brome, Missisquoi county, Quebec, Little Metis, Gulf of St. Lawrence, Nova Scotia, Newfoundland, Moose Factory. Has been taken in each month from May to October. Food plants—Green Alder, Willow, Birch, Currant, Gooseberry.

23. *GRAPTA PROGNE*, *Cram.* (*Polygonia Progne*). Fig 5. Common throughout the Eastern Provinces of Canada. Nepigon, Fort William, Sault Ste. Marie, Vermilion lake (Lake Huron), Sudbury, Cameron lake, Amherstburg, London, Hamilton, Credit, Port Hope, Cobourg, Peterborough, Ottawa; Montreal, River Rouge district, Eastern Townships, Quebec, Little Metis, Godbout river, Lower St. Lawrence and Bay of Chaleur, Anticosti, Restigouche river. N.B., Nova Scotia. Lat. 54° (Kirby). Flies from May to October; earliest date May 14, latest October 20. Food plants—Currant, Gooseberry, *Betula papyrifera*, Elm.



Fig. 5.

24. *GRAPTA GRACILIS*, *Grote and Rob.* (*Polygonia Gracilis*). Taken in northern Ontario and in Quebec. Nepigon, Sudbury, Quebec, Levis, Little Metis. Flies in July, August and September. Food plant—Currant.

25. *GRAPTA J-ALBUM*, *Boisd-Lec.* (*Eugonia J-Album*). Common throughout the Eastern Provinces of Canada. Sault Ste. Marie, Bruce Mines, north of Lake Huron, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Lake Simcoe, Ottawa; Montreal, River Rouge district, County of Grenville, Eastern Townships, Sorel, Quebec, Little Metis, Godbout river, Bay of Chaleur, Labrador, Nova Scotia. Flies during August and September; hibernating specimens are often found during the winter in houses and

appear on the wing on warm days in March and April; taken also in May and July; autumn brood appears in September and October. Food plant—White birch.

26. *VANESSA ANTIOPA*, Linn. (*Euvanessa Antiopa*). Abundant throughout the Eastern Provinces of Canada. Nepigon, Sault Ste. Marie, north of Lake Huron, Sudbury, Lake Simcoe, London, Credit, Toronto, Hamilton, Port Hope, Cobourg, Ottawa; Montreal, Eastern Townships, River Rouge district, Quebec, Little Metis, Rimouski, Godbout river, Anticosti, Labrador, Newfoundland, Nova Scotia, Prince Edward Island. Hibernated specimens appear at the end of March and early in April; common throughout the whole summer, the second brood appearing in August; common in September, and individuals are found till the end of October. Food plants—Willow, Elm, Poplar.

27. *VANESSA MILBERTI*, Godt. (*Aglais Milberti*). As widely distributed as the preceding species. Nepigon, Sault Ste. Marie, Amberstburg, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa; Montreal, River Rouge district, Eastern Townships, Quebec, Isle of Orleans, Little Metis, Godbout river, Saguenay, Labrador; Newfoundland, Cape Breton, Nova Scotia, Moose Factory. Hibernated specimens appear in March and April; more or less abundant throughout the summer; individuals seen in October as late as the 18th. Food plant—Nettle.

28. *PYRAMEIS ATALANTA*, Linn. (*Vanessa Atalanta*). Abundant throughout the Eastern Provinces of Canada. Nepigon, Sault Ste. Marie, London, Point Pelee, Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa; Montreal, River Rouge district, Sorel, Quebec, Little Metis, Godbout River, Anticosti, Labrador, Newfoundland, Nova Scotia, Prince Edward Island, Moose Factory. Taken from May to August; very abundant in June when the lilacs are in blossom; occasionally seen in October. Food plants—Nettle, Hop.

29. *PYRAMEIS CARDUI*, Linn. (*Vanessa Cardui*). Abundant everywhere. Nepigon, Sault Ste. Marie, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa; Montreal, River Rouge district, Eastern Townships, Sorel, Quebec, Cacouna, Little Metis, Grand Metis, Godbout river, Anticosti; Dalhousie and St. John, N.B., Nova Scotia, Newfoundland, Prince Edward Island. Flies at the end of May and throughout the summer months till September; occasionally seen in October. Food plants—Thistle, Mallow, Hollyhock, Burdock, Wild Sunflower.

30. *PYRAMEIS HUNTERA*, Fabr. (*Vanessa Huntera*). Widely distributed, but not so abundant as the preceding species. Nepigon, Sault Ste. Marie, Point Pelee, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa; Montreal, Quebec, Isle of Orleans, Little Metis, Godbout river, St. John, N.B., Nova Scotia. Flies in July, August and September. Food plants—Gnaphalium, Thistle, Myosotis.

31. *JUNONIA COENIA*, Hubn. Fig. 6. Very rare in Canada. Has been taken at Chatham, Port Stanley, London, Stratford and Ridgeway in Ontario. Food plants—Gerardia, Antirrhinum, Plantago, Linaria Canadensis.

32. *LIMENITIS ARTHEMIS*, Drury. (*Basilarchia Arthemis*). Abundant throughout the Eastern Provinces of Canada. Lake of the Woods, Nepigon, Sault Ste. Marie, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Lakefield, Belleville, Ottawa, Montreal, River Rouge district, Eastern Townships, Sorel, Quebec, Sherbrooke, Little Metis, Godbout river, Lower St. Lawrence, Tobique river, N.B., Nova Scotia, Cape Breton, Newfoundland, Moose Factory. Flies in June, July and August, often seen in immense numbers. Food plants—Willow, Black and Yellow Birch, Poplar, Thorn, Plum, Cherry, Amelanchier.

33. *LIMENITIS PROSERPINA*, Edw. (*Basilarchia Proserpina*). Excessively rare. Specimens have been taken at Hamilton, Roachs' Point, Lake Simcoe (August 22, 1894), Rideau Hall, Ottawa, and Halifax, N.S.

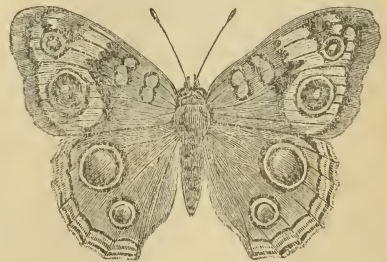


Fig. 6.

34. *LIMENTIS URSULA*, *Fabr.* (*Basilarchia Ursula*.) Very rare in Canada. Has been taken at Port Stanley, London, and in Essex county, Ontario. Plentiful at London 1893 (Moffat). Food plants—Cherry, Currant, Oak, Willow, *Vaccinium*, Apple, Quince, Hawthorn, Plum.



Fig. 7.

35. *LIMENTIS DISIPPUS*, *Godt.* (*Basilarchia Archippus*.) Widely distributed, but not very abundant. Amherstburg, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Rice lake, Ottawa, Montreal, L'Original, Little Metis, St. John, N.B., Nova Scotia. Flies in June, July and August; occasionally seen in September and October.

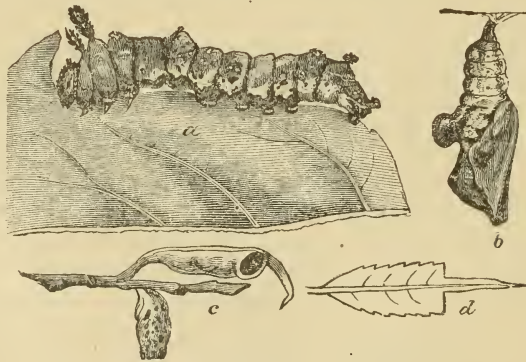


Fig. 8.

Food plants—Willow, Poplar, Plum, Apple, Oak. Fig. 7 the butterfly; fig. 8, *a*, the larva, *b*, the chrysalis, *c* and *d*, the larva case.

Sub-family *Satyrince*.

36. *DEBIS PORTLANDIA*, *Fabr.* (*Enodia Portlandia*.) Very rare. In Ontario it has only been taken at Ottawa. In Quebec at Hull and Kirk's Ferry, Montreal, Chateauguay Basin, River Rouge district, Eastern Townships, Compton, Quebec; Nova Scotia. Flies in July and August. Food plants—Grasses.

37. *NEONYMPHA CANTHUS*, *Boisd-Lec.* (*Satyrodes Eurydice*, Linn; *Neonympha Boisduvallii*, Harris.) Not very abundant. Has been taken at Sault Ste. Marie, Essex county, London, Hamilton, Toronto, Grafton and Ottawa (common) in Ontario; at Montreal, Compton and Quebec; Mingan Islands, Nova Scotia. Flies in June, July and August. Fig. 9. Food plants—Grasses and Sedges.

38. *NEONYMPHA EURYTRIS*, *Fabr.* (*Cissia Eurytris*.) Widely distributed, and not uncommon. Sudbury, Essex county, London, Hamilton, Credit, Toronto, Port

Hope, Cobourg, Rice lake, Ottawa, Montreal, Eastern Townships, Quebec. Flies in June and July. Fig. 10. Food plant—Grasses.

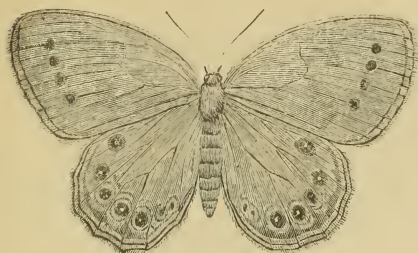


Fig. 9.



Fig. 10.

39. *CÆNONYMPHA INORNATA*, *Edw.* A very rare butterfly. Taken at Massasauga Point (Macoun), Lake Winnipeg, Sault Ste. Marie, and in Newfoundland and Labrador.

40. *EREBIA DISCOIDALIS*, *Kirby.* The only Eastern Canadian record is its capture at Sudbury by Mr. J. D. Evans, May 12, 1889.

41. *SATYRUS NEPHELE*, *Kirby.* (*Cercyonis Nephela.*) Abundant throughout the Eastern Provinces of Canada, County of Essex, London, St. Catharines, Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa, Montreal, River Rouge district, Quebec, Little Metis, New Brunswick, Nova Scotia, Prince Edward Island. Flies throughout July and August; taken from June 10 to 20, in Essex county, Ontario. Food plant—Grasses.

42. *SATYRUS ALOPE*, *Fabr.* (*Cercyonis Alope.*) This more southern form has been taken at St. John, N.B., and in Nova Scotia and Prince Edward Island.

43. *CHIONOBAS MACOUNII*, *Edw.* (*Oeneis Macounii.*) This rare butterfly has only been taken at Nepigon, from June 28 to July 13. Food plant—Sedges.

44. *CHIONOBAS JUTTA*, *Hubn.* (*Oeneis Jutta.*) A very rare and local sub-arctic species. Has been taken at Nepigon, Ottawa, the Gomin Swamp, Quebec, Bergerville, P.Q., and in Labrador. Food plant—Carices.

Sub-family *Libytheineæ.*

45. *LIBYTHEA BACHMANI*, *Kirtl.* (*Hypatus Bachmani.*) Fig 11. Very rare in Canada. Has been taken at Port Stanley, London and Hamilton in August. Food plant—Celtis.



Fig. 11.

Family LYCENIDÆ.

Sub-family *Lycenineæ.*

46. *THECLA ACADICA*, *Edw.* Rare. Has been taken at London, Hamilton, Ottawa, Montreal and St. Rose, P.Q. Flies in July. Food plant—Willow.

47. *THECLA MELINUS*, *Hubn.* (*Uranotes Melinus.*) Very rare in Canada. Has been taken at London, Hamilton, Montreal. Flies in July. Food plants—Hops, Beans, Cynoglossum, Cratægus.

48. *THECLA EDWARDSII*, *Saund.* (*Falacer*, Harris.) Very rare. Has been taken at London, Hamilton, Credit and Ottawa (rare), in July. Food plant—Oak.

49. *THECLA CALANUS*, *Hubn.* (*Inorata*, Grote-Rob; *Falacer*, Godt.) Usually rare, but sometimes abundant. Has been taken at London, Hamilton, Ottawa and Montreal, in July and August. Food plants—Oak, Butternut, Hickory.

50. *THECLA ONTARIO*, *Edw.* Taken only at Port Stanley, Ont., by Mr. E. B. Reed, in July, 1868.

51. *THECLA STRIGOSA*, *Harr.* (*Liparops*, Scud.) Rare. Taken at Oameron Lake, London, Ottawa and Montreal, July. Food plants—Thorn, Shadbush (*Amelanchier*), Blueberry (*Vaccinium*), Plum.

52. *THECLA SMILACIS*, *Boisd.-Lec.* (*Mitura Damon*, Cram.) Has been taken only at Point Pelee, Ont., by Mr. Saunders. Food plant—Red Cedar.

53. *THECLA AUGUSTUS*, *Kirby.* (*Incisalia Augustus.*) Has been taken at London and Ottawa, Montreal, Bergerville and Quebec, and at Halifax, N.S.

54. *THECLA IRUS*, *Godt.* (*Incisalia Irus*) This very rare butterfly has been taken at Nepigon by Mr. Macoun, and at Montreal by Mr. Bowles. Food plant—Wild Plum.

55. *THECLA NIPHON*, *Hubn.* (*Incisalia Niphon.*) Rare. Has been taken at London and Ottawa, Montreal, Chelsea, Sorel, P.Q., Halifax, N.S. Flies in May. Food plant—Pine.

56. *THECLA LÆTA*, *Edw.* (*Erora Lata.*) Very rare. Taken at London and York Mills, Ont., Beloeil Mountain, St. Joachim, St. Hilaire and Quebec. Flies during the latter part of May.

57. *THECLA TITUS*, *Fabr.* (*Mopsus*, Hubn.; *Strymon Titus.*) Widely distributed, but rather rare in Canada. Nepigon, Sudbury, London, Hamilton, Credit, Toronto, Ottawa, Montreal, Oka, Eastern Townships, Quebec. Flies in July and August. Food plants—Wild Cherry, Oak.

58. *FENISECA TARQUINIUS*, *Fabr.* Widely distributed, but not common. Sudbury, London, Hamilton, Credit, Toronto, Stony Lake, Ottawa, Montreal, Cowansville, Township of Stanbridge, Island of Orleans, P.Q.; Halifax, N.S. Has been taken from May 24th, through the summer to September. Larva feeds upon plant lice (Aphides).

59. *CHRYSOPHANUS THOE*, *Boisd.-Lec.* Taken in Ontario and Quebec, but very locally on the margin of rivers or lakes. Nepigon, London, Hamilton, Port Hope, Cobourg, Ottawa, Montreal, Lachine, Quebec, Eastern Townships. Flies in August and earlier part of September. Figs. 12 and 13. Food plants—Rumex and Polygonum.



Fig. 12.



Fig. 13.

60. *CHRYSOPHANUS FLORUS*, *Edw.* Five specimens of this rare butterfly were taken at Nepigon by Prof. Macoun. It has also been taken by Capt. Brown in Newfoundland.

61. *CHRYSOPHANUS DORCAS*, *Kirby.* Kirby's record is lat. 54°. It is reported from Labrador in July.

62. *CHRYSOPHANUS EPIXANTHE*, *Boisd.-Lec.* (*Epidemia Epixanthe*). Rarely seen, but very widely distributed; frequents the borders of swamps and peaty meadows. Has been taken at London, Toronto, Ottawa, Montreal, the Gomin Swamp, Quebec, Cape Breton, Newfoundland. Flies in July. Food plant unknown.

63. *CHRYSOPHANUS HYPOPHLEAS*, *Boisd.* [*C. Americana D'Urban*] (*Heodes Hypophleas*). Very common throughout Ontario and Quebec. Nepigon, Sault Ste. Marie, Sudbury, county of Essex, London, Credit, Toronto, Port Hope, Cobourg, Ottawa, Montreal, River Rouge district, Eastern Townships, Sorel, Quebec, Cacouna, Little Metis, Prince Edward Island, Moose Factory. Flies from the end of May to September. Food plant—Sheep's Sorrel (*Rumex acetosella*).

64. *LYCÆNA PEMBINA*, *Edw.* Has been taken at Cacouna, P.Q., by Mr. Saunders in July, 1866 (*Can. Ent.*, Vol. I., p. 12).

65. *LYCÆNA COUPERII*, *Grote*. Rare. Has been taken at Nepigon and Brantford, Ont.; Heights of Levis, Cacouna, Little Metis and Godbout river, P. Q., Anticosti, Labrador, Newfoundland.

66. *LYCÆNA SCUDDERII*, *Edw.* (*Rusticus Scudderii*). Locally abundant. Has been taken at Nepigon, London, Toronto, Cobourg, north shore of the St. Lawrence, Anticosti, Labrador, Hudson bay. Cape Breton. Flies at the end of May, in June and August. Food plant—Lupin.

67. *LYCÆNA PSEUDARGIOLUS*, *Boisd.-Lec.* (Winter forms *LUCIA*, *Kirby*; *VIOLACEA*, *Edw.*; summer form *NEGLECTA*, *Edw.*—*Cyaniris Pseudargiolus*). Very widely distributed. Nepigon, Sudbury, London, Hamilton, St. Catharines, Toronto, Port Hope, Cobourg, Ottawa, Montreal, Eastern Townships, River Rouge district, Quebec, Riviere du Loup, Godbout river, Anticosti, lower St. Lawrence, Labrador, Prince Edward Island. Lat. 54° (*Kirby*). Appears very early in the spring, and may be found in April and May (forms *Lucia* and *Violacea*); in June and July in the more northern localities; the form *Neglecta* is found during June, July and August, and into September. Food plants—Cornus, Actinomeris, Viburnum, Acer spicatum, Willow, and a great variety of other plants (vide *Scudder's Butterflies of the Eastern United States and Canada*, p. 938).

68. *LYCÆNA COMYNTAS*, *Godt.* (*Everes Comyntas*). Not uncommon. Has been taken at Nepigon, Sudbury, London, Hamilton and Ottawa; Montreal, Lachine, Chateauguay Basin. Flies in May, June, July and August. Food plants—Leguminous plants, Lespedeza, Desmodium, Clover, Lathyrus.

Family PAPILIONIDÆ.

Sub-family Pierinæ.

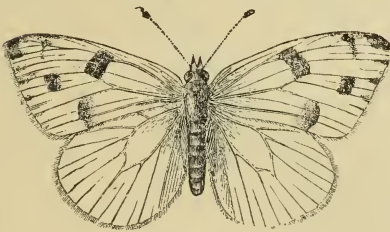


Fig. 14.

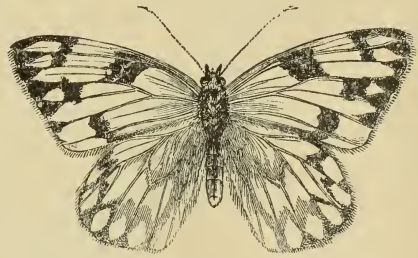


Fig. 15.

69. *PIERIS PROTODICE*, *Boisd.-Lec.* (*Pontia Protodice*). Formerly common, but now rarely seen. Sault Ste. Marie, Amherstburg, Port Stanley, London, Hamilton, Toronto,

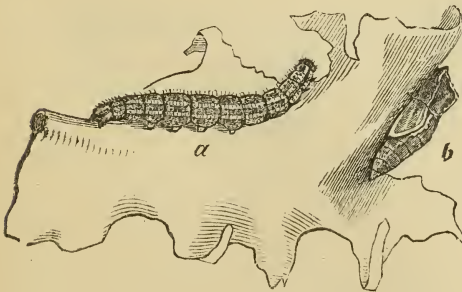


Fig. 16.

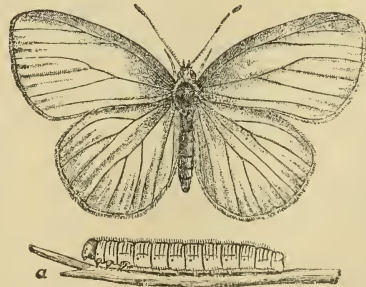


Fig. 17.



Fig. 18.

Cobourg, Lachine, P.Q. Has been taken from May to October. Food plants—Cabbage and other cruciferous plants. Fig. 14, male; fig. 15, female; fig. 16—*a* larva, *b* chrysalis.

70. *PIERIS NAPI*, *Esper.* (Forms *OLERACEA-HIEMALIS*, *Harr.*; *BOREALIS*, *Grote*; *FRIGIDA*, *Scud.*; *VIRGINIENSIS*, *Edw.*; *OLERACEA-ÆSTIVA*, *Harris*). Taken throughout the Eastern Provinces of Canada. Formerly very abundant, but since the wide-spread introduction of *P. rapæ*, this and the preceding species have become quite rare. Recorded from Nepigon, Sault Ste. Marie, Bruce Mines, north of Lake Huron, Sudbury, Collingwood, Amherstburg, London, Hamilton, Toronto, Port Hope, Cobourg, Ottawa, Montreal, Cowansville, River Rouge district, Quebec, Little Metis, Lower St. Lawrence, Anticosti, Labrador, Newfoundland, Cape Breton. Lat. 65° (Kirby). Hudson Bay. The form *Borealis* has been taken at Godbout river, P.Q.; *Frigida* at Mingan, Anticosti and the south and east coasts of Labrador; the aberrant form *Virginienis* at Hamilton and Fort William. Food plants—Turnips and other cruciferous plants. Fig. 17 butterfly, and *a* the larva; fig. 18 chrysalis.

71. *PIERIS RAPÆ*, *Linn.*, and aberrant form *var NOVÆ ANGLIÆ*, *Scud.* Since its introduction to this country at Quebec, in 1858, it has spread over a large portion of the continent, and is everywhere one of the commonest butterflies. Flies from April to



Fig. 19.



Fig. 20.



Fig. 21.

October. Food plants—Cabbage and other cruciferous plants, mignonette, stocks. Fig. 19, male butterfly; fig. 20, female; fig. 21—*a* larva, *b* chrysalis.

72. *COLIAS CÆSONIA*, *Stoll.* (*Zerene Cæsonia*). Mr. Scudder gives "Southern Ontario" as one of its localities, but I can find no recorded place of capture. Mr. Moffat tells me that it was taken at Long Point, Lake Erie. Food plants—Clover, *Amorpha*.

73. *COLIAS EURYTHEME*, *Boisd.* [Forms *KEEWAYDIN*, *Edw.*; *ERIPHYLE*, *Edw.*] (*Eurymus Eurytheme*). Abundant north of Lakes Superior and Huron; occasionally taken in more southern localities. Nepigon, Fort William, Port Arthur, Bruce Mines, Sault Ste. Marie, London, St. Catharines, Port Hope (Oct. 15), Ottawa, Hull, Montreal, Missisquoi county, Quebec. Food plant—White Clover.



Fig. 22.

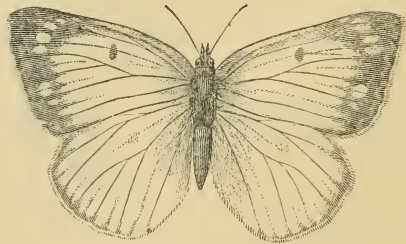


Fig. 23.

74. *COLIAS PHILODICE*, *Godt.* (*Eurymus Philodice*). One of the commonest butterflies throughout the Provinces of Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. Abundant from the middle of May to September; occasionally taken as early as April 9th, and as late as October 19th. Food plants—Clover, Pea, Lupin. Fig. 22, male; fig. 23, female.

75. *COLIAS INTERIOR*, *Scud.* (*Eurymus Interior*). Abundant north of Lakes Superior and Huron; occasionally taken further east. Nepigon, Port Arthur, Fort William, Spanish river, Georgian bay, Sudbury, Ottawa, Montreal, Owl's Head Mountain, Quebec, Heights of Levis, Moose Factory. Flies in July and August. Food plant—Willow.

76. *COLIAS INTERIOR*, *var LAURENTINA* *Scud.* Is recorded from Montreal (Caulfield, July, 1874); Quebec (Fyles); Godbout river, Anticosti, Mingan, Labrador, Newfoundland, Prince Edward Island, Cape Breton.

77. *TERIAS NICIPPE*, *Cram.* (*Xanthidia Nicippe*.) This southern butterfly has been once taken at Point Pelee, Ont. Food plant—Oassia.

TERIAS MEXICANA, *Boisd.* has also been taken at Point Pelee, by Mr. Saunders, June 29, 1882.

78. *TERIAS LISA*, *Boisd-Lec.* (*Eurema Lisa*) Has been taken at Point Pelee (June 29, 1882, Saunders); Port Stanley (August, 1861); London, Hamilton (Moffat, June 23, 1882,) Food plants—Clover, Cassia.

Sub-Family, *Papilioninae*.

79. *PAPILIO AJAX*, *Linn.* [Form *MARCELLUS*, *Boisd.*] (*Iphiclides Ajax*.) Occasionally taken in June in the extreme southern parts of Ontario, North Ridge, county of Essex, Point Pelee, Long Point, Ridgeway, Komoka, near London. Food plant—Pawpaw.



Fig. 24.

80. *PAPILIO TURNUS*, *Linn.* (*Jasoniades Glaucus*.) Abundant throughout the Provinces of Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island; also; in Newfoundland. Flies during the latter part of May, throughout June and part of July, sometimes in enormous numbers. Food plants — Apple, Thorn, Aspen, Poplar, Willow, Cherry, Alder, Basswood, Oak, Black and White Ash, Birch, Aspen, Tulip wood, Amelanchier Canadensis. Fig. 24, butterfly; Fig. 25, caterpillar.

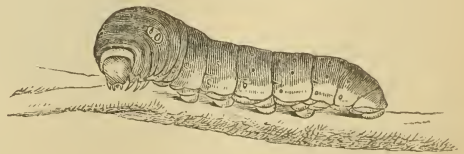


Fig. 25.

81. *PAPILIO ORESPHONTES*, *Cram.* (*Papilio Thoas*, *Boisd.*; *Heraclides Cresphontes*) Fig. 26. Spreading gradually through southwestern Ontario. Has been taken in the

county of Essex, at Amherstburg, Sandwich, Windsor, Belle Isle, Chatham, Point Pelee, St. Thomas, Long Point, Thedford, Dunnville, London, Dundas, Hamilton, Ridgeway,



Fig. 26.

Toronto, Roach's Point, Lake Simcoe, Sparrow lake. In Quebec at Chateauguay Basin and at St. John, N. B. Flies in June, July and August. Food plants—The Citrus family, Rutaceæ, Prickly Ash, Hop-tree (*Ptelea trifoliata*) *Dictamnus fraxinella*, *Ruta graveolens*.

82. *PAPILIO BREVICAUDA*, *Saunders*. Taken only in the extreme east; Godbout River, Anticosti, Labrador, Newfoundland, Gaspè and Dalhousie, N. B. Food plants—*Ligusticum*, *Pastinaca*.



Fig. 27.

83. *PAPILIO ASTERIAS*, *Fabr. Papilio, Polyxenes.*) Fig. 27. Abundant throughout the western peninsula and eastern parts of Ontario; not common in the Province of

Quebec. County of Essex, Amherstburg, London, West Flamboro, Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa, Montreal, "150 miles east and west of Quebec" (Bowles), Lorette, Cacouna, Little Metis, Labrador, New Brunswick, Newfoundland. Flies at the end of May and through June, July and August; most abundant during the last-named month. Food plants—Celery, Carrot, Parsley and other umbelliferous plants.

84. *PAPILIO TROILUS*, Linn. (*Euphaeades Troilus*.) Confined to the western peninsula of Ontario, where it is common. County of Essex, Point Pelee, Dunnville, London, West Flamboro, Hamilton, St. Catharines, Credit. Flies during June, July and August. Food plants—Spice bush, Sassafrass.



Fig. 28.

85. *PAPILIO PHILENOR*, Linn. (*Laertias Philenor*.) An occasional visitor to southwestern Ontario. Long Point, Ridgeway, Woodstock, West Flamboro, Hamilton, Grimsby, Humber Plains, Toronto. Only seen in the month of June. Food plant—Dutchman's Pipe (*Aristolochia siphon*.) Fig. 28, butterfly; Fig. 29 a and b, chrysalis; Fig. 30, caterpillar.

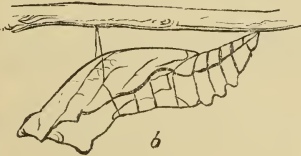


Fig. 29.

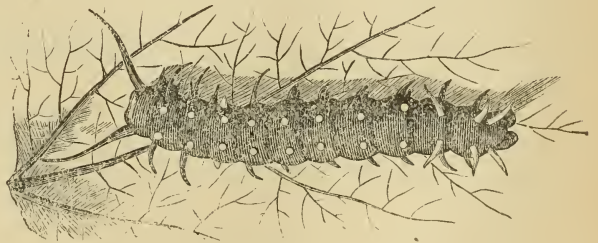


Fig. 30.

Family *Hesperidae*.

86. *CARTEROCEPHALUS MANDAN*, Edw. Taken in the northern parts of Ontario and in Quebec. Nepigon, Sault Ste. Marie, St. Joseph's Island, Lake Huron, Sudbury, Bobcaygeon, Ottawa, Lake Mistassini, Lachine, Compton, Bergerville, Levis, Quebec, Godbout river, Anticosti, Labrador. Flies in June and July. Food plant—Grass.

87. *ANCYLOXYPHA NUMITOR*, Fabr. (*Heteropterus Marginatus*, Harris.) Widely distributed but extremely local. Point Pelee, London, Hamilton, Grimsby, St. Cathar-

ines, Township of Shefford, River Yamaska, P. Q. Has been taken in June, August and September. Frequents low marshy places. Food plant—Grass.

88. PAMPHILA MASSASOIT, *Scud.* (*Poanes Massasoit.*) Only recorded by Mr. Scudder as from "Ontario (Saunders)"

89. PAMPHILA ZABULON, *Boisd.-Lec.* [Forms HOBOMOK, *Harris*; POCOHONTAS, *Scud.*] (*Atrytone Zabulon.*) Not uncommon in one or other of its forms throughout Ontario and Quebec. Taken at Nepigon, Sudbury, county of Essex, London, Hamilton, Credit, Toronto, Ottawa. Montreal, Chateauguay Basin, Compton, Quebec, Dalhousie, N. B., Nova Scotia. Flies in June and July. Food plant—Grass.

90. PAMPHILA MANITOBA, *Scud.* (*Erynnis Manitoba.*) Inhabits northern Ontario and Quebec. Nepigon, Sudbury, Kirk's Ferry, Quebec, Levis, Cacouna, Riviere du Loup, Little Metis, Gaspé. Taken in July, August and September.

91. PAMPHILA LEONARDUS, *Harris.* (*Anthomaster Leonardus.*) Taken sparingly in Ontario and Quebec. London, Hamilton, Credit, Toronto, Port Hope, Chelsea, Hull, Montreal, Chateauguay Basin. Flies in July and September. Food plant—Grass.

92. PAMPHILA OTHO, *Sm.-Abb.* [Variety EGEREMET, *Scud.*], (*Atma, Scud.*) Very rare. Has been taken at Hamilton, London, Prescott, and in the Eastern Townships, P. Q. (Fyles).

93. PAMPHILA PECKIUS, *Kirby.* [WAMSUTTA, *Harris*] (*Polites Peckius.*) Common and very widely distributed. Nepigon, Sudbury, London, Hamilton, Credit, Toronto, Port Hope, Cobourg, Ottawa, Montreal, Quebec, Little Metis, New Brunswick, Nova Scotia, Cape Breton, Moose Factory, Prince Edward Island. Flies in June, July, and occasionally in August. Food plant—Grass.

94. PAMPHILA MYSTIC, *Scud.* (*Thymelicus Mystic.*) Frequents the same localities as the preceding. Nepigon, Sudbury, London, Hamilton, Port Hope, Ottawa, Montreal, Chateauguay Basin, Quebec, Cacouna, Ha! Ha! bay; Nova Scotia, New Brunswick and Prince Edward Island. Flies in June, July and August. Food plant—Carex.

95. PAMPHILA CERNES, *Boisd.-Lec.* [AHATON, *Harris.*] (*Limochores Taumas, Fabr.*) Very abundant throughout eastern Canada. Nepigon, London, Hamilton, Credit, Toronto, Port Hope, Ottawa, Montreal, Chateauguay Basin, Eastern Townships, Quebec, Nova Scotia, Cape Breton, Prince Edward Island. Flies in June and July. Food plant—Grass.

96. PAMPHILA MANATAAQUA, *Scud.* (*Limochores Manataaqua.*) The only Canadian localities I have found are "Canada West" (British Museum Catalogue); Prince Edward Island (Macoun.)

97. PAMPHILA METACOMET, *Harris.* (*Euphyes Metacomet.*) Not common. Has been taken at Nepigon, Sudbury, London, Hamilton, Ottawa, Montreal, Heights of Levis. In July. Food plant—Carex.

98. PAMPHILA PONTIAC, *Edwards.* (*Limochores Pontiac.*) The only Canadian locality is Montreal (Caulfield, teste Strecker.)

99. PAMPHILA DION, *Edw.* (*Limochores Palatka, Edw.*) Taken only at Hamilton by Mr. Moffat.

100. PAMPHILA VIATOR, *Edw.* (*Phycanassa Viator.*) This southern butterfly has been taken at Hamilton by Mr. Moffat, and on the Humber Plains near Toronto by Mr. Geddes.

101. PAMPHILA VITELLIUS, *Sm.-Abb.* [*Delaware, Edw.*; *Logan, Edw.*] Taken only at London by Mr. Saunders.

102. AMBLYSCIRTES VIALIS, *Edw.* Rare. Has been taken at Nepigon, Sudbury, London, Ottawa, Chelsea, Montreal and Eastern Townships. In June and July. Food plant—Grass.

103. AMBLYSCIRTES SAMOSET, *Scud.* Occurs even more rarely than the preceding. Has been taken at Ottawa, May 27, 29; Eastern Townships and Levis, P.Q., Nova Scotia. Flies in the end of May and in June.

104. *Pyrgus tessellata*, *Scud.* (*Hesperia Montivaga*, *Reak.*). A southern and western species which has only been reported from Essex county, Ontario. (Lowe, *Can. Ent.*, vii., p. 140.)

105. *Pyrgus centaureæ*, *Ramb.* (*Hesperia Centaureæ*). A northern circumpolar species. It has been taken at Wabigoon, on the C. P. R. (about 200 miles west of Fort William), and in Labrador (Low).

106. *Nisoniades Brizo*, *Boisd.-Lec.* (*Thanaos Brizo*). Widely distributed, but not very common. Sudbury, London, Hamilton, Toronto, Ottawa, Montreal, Quebec, Nova Scotia, Prince Edward Island. Flies in June. Food plant—Scrub Oak.

107. *Nisoniades icelus*, *Lint.* (*Thanaos Icelus*). Abundant locally, but not common. Nepigon, Sudbury, Hamilton, Ottawa, Montreal, Quebec, Nova Scotia. Flies in June and July. Food plants—Aspen, Willow, Witch-hazel.

108. *Nisoniades Lucilius*, *Lint.* (*Thanaos Lucilius*). Only recorded in Ontario from London and Ottawa. Flies in May, July and August. "In 1893 so abundant at Ottawa as to be noticeably injurious to garden Columbines" (Fletcher). Food plant—Wild Columbine (*Aquilegia Canadensis*).

109. *Nisoniades Persius*, *Scud.* (*Thanaos Persius*). Has been sparingly taken in the county of Essex, London, Hamilton, Toronto, Ottawa and at Saguenay, P. Q. Flies in May and June. Food plants—Willow, Poplar.

110. *Nisoniades Martialis*, *Scud.* (*Thanaos Martialis*). A southern species, which has been taken at London, Hamilton and Toronto.

111. *Nisoniades Juvenalis*, *Fabr.* (*Thanaos Juvenalis*). Not common. Has been taken at London, Hamilton, Toronto, Cobourg, Ottawa (rare). Flies in May and early June. Food plants—Oak and various leguminous plants.

112. *Pholisora Catullus*, *Fabr.* Not common. Has been taken in the county of Essex, Point Pelee, London, Hamilton, Toronto, Eastern Townships and Quebec. Flies in June. Food plants—Chenopodium, Aramantus.

113. *Eudamus Electra*, *Lint.* (*Thorybes Electra*). This butterfly has only been taken by Mr. Moffat at Hamilton. The only specimen, a female, is in the possession of Dr. Holland, of Pittsburg, Penn.

114. *Eudamus Pylades*, *Scud.* (*Thorybes Pylades*). Common in certain localities. Has been taken at Nepigon, Sudbury, London, Hamilton, Ottawa, Montreal, Chateauguay Basin. Flies in May, June and July. Food plants—Clover, Lespedeza and other leguminous plants.

115. *Eudamus Bathyllus*, *Sm.-Abb.* (*Thorybes Bathyllus*). This southern species has been taken in the county of Essex, at London, Hamilton, Toronto, Rice lake, Ottawa. Flies in June and July.

116. *Eudamus Tityrus*, *Fab.* (*Epargyreus Tityrus*). Very widely distributed throughout Ontario and Quebec; common, but not numerous. County of Essex, Point Pelee, London, Hamilton, St. Catharines, Credit, Toronto, Port Hope, Ottawa, Montreal, Chateauguay Basin, Quebec. Flies in May, June and July. Food plant—Locust, Acacia, *Lathyrus palustris*; *Apios tuberosa*.

POSTSCRIPT.—Since this list was prepared I have learnt that the following species has been taken within our limits:

117. *Lycæna Aquilo*, *Boisd.* [*Franklinii*, *Curtis*]. This northern species was taken at Nepigon by Mr. Fletcher, July 7, 1894. It is also reported from Labrador, Hudson straits, Newfoundland (Gosse).

The following species do not come strictly within the limits that we have adopted, but may be mentioned as possible additions to our fauna:

Argynnis Polaris, *Boisd.* Hudson straits (Payne and Bell).

Chionobas Calais, *Scud.* Rupert House, Hudson bay; Newfoundland.

- CHIONOBAS TAYGETE, *Hubner*. Hudson straits (Payne).
 CHIONOBAS SEMIDEA, *Say*. Labrador, Hudson straits, Newfoundland.
 CHIONOBAS CRAMBIS, *Frey*. Hudson straits (Payne).
 CHIONOBAS CENO, *Boisd.* Labrador (Couper).
 CHIONOBAS BORE, *Esp.* Labrador (Couper).
 LYCENA ASTER, *Edw.* Newfoundland (Gosse, Mead).
 LYCENA LYGDAMUS, *Doubl.* Labrador (Couper).
 PAPILIO MACHAON, *Linn.* Rupert House, Hudson bay (Payne).
 COLIAS BOOTHII, *Curt., var.* CHIONE, *Curt.* Hudson straits (Payne, Geddes, Can. Ent., xxi., 59).
 COLIAS HECLA, *Lef.* Hudson Straits (Payne).
 COLIAS EDWARDSII, *Behr.* Fort William (Geddes).
 COLIAS NASTES, *Boisd.* Labrador ; Hudson straits (Payne).
 COLIAS LABRADORENSIS, *Scud.* Labrador.
 COLIAS SCUDDERII, *Reak.* Labrador, Hudson bay.

THE PITCHER-PLANT MOTH.

(*Exyra Rolandiana*, Grt.)

BY JAMES FLETCHER, OTTAWA.

There are few of our native plants of so much interest as our native pitcher-plant, *Sarracenia purpurea*, from its peculiar beauty and the curious shape of its leaves and flowers, and there are few insects more interesting than the pretty little moth *Exyra Rolandiana*, of which the caterpillars or cocoons may generally be found by making a close search inside the leaves of the pitcher-plant during the month of June or early in July.

This moth was first described by Mr. A. R. Grote in *Psyche*, vol. ii., 1877, page 38, from specimens reared by Mr. Roland Thaxter, at Newton, Mass. It is a small, thick-set insect, about three-eighths of an inch in length, of a dark, metallic, purplish hue which on the forewings is relieved by a yellowish discal patch. The base of the wings is deep red. The dark color on the wings of the females is much blacker than in the other sex. The hind wings in both sexes are black. When at rest the wings are sloped like those of a *Plusia*.

In the *Canadian Entomologist* for 1874, vol. vi, page 207, Prof. Riley contributed an article "On the Insects More Particularly Associated with *Sarracenia variolaris*," and in this article he treats of the closely allied moth, *Xanthoptera semicrocea*, in a most entertaining manner, giving figures of all its stages. The insect-catching power of the pitcher-plants is well known and has been frequently referred to. By an examination of the decaying remains, which may be at any time found in the leaves, it will be seen that insects of almost all orders fall a prey to these treacherous death traps. Ants, however, seem to far outnumber all other kinds of insects, and Prof. Riley suggests that the acidulous properties which their decomposing bodies give to the liquid, with which the lower portion of the pitcher is always filled, render it all the more potent as a solvent of the bodies of the entrapped insects, from which doubtless the plants derive benefit, if indeed they be not, as some believe, truly insectivorous. The leaf of the pitcher plant, from its shape, namely that of a hollow tube tapering to a point at the base, swollen a little above the middle and contracted at the mouth, forms a trap from which it is very difficult for any insects to escape when they have once entered. In addition to the shape of the leaf there are other characters which add to the difficulty of egress. Above the

mouth of the pitcher is a wide expanded hood with stiff bristles pointing down towards the opening, and any insect settling upon this expansion is unconsciously directed toward the danger lying beneath, by finding it, when attempting to walk, much easier to go in the direction of the bristles. The orifice of the pitcher is highly polished and difficult for most insects to find a footing upon; experience shows that a great many fall into the trap. Once inside, they are met with new dangers; the lower third of the pitcher is filled with water, and should they succeed in crawling out of this, the upper portion of the tubes down to the swollen part is thickly beset with fine bristles pointing downward, so that it is almost impossible for luckless captives to regain their liberty. There are, however, a few kinds of insects which are able to brave these dangers with impunity. One of these is a large flesh fly, of which the white maggots may generally be found during the summer revelling in the decomposing remains of other insects at the bottom of the pitcher. When full-grown, they bore their way out through the walls of the leaf and pupate in the surrounding moss. Another species is the pretty little moth referred to above, of which I have studied a few specimens every summer for the last three years.

My first acquaintance with this insect was upon finding the moth inside a pitcher in June, 1890. Since that time I have collected similarly located larvæ of various sizes and the cocoons. I have also bred the larvæ from after the third moult in confinement.

Mr. Roland Thaxter says: "The larvæ of *Exyra Rolandiana* may be found in the smaller leaves of *Sarracenia purpurea* in this vicinity (Newton, Mass.) as soon as the snow is off the ground early in spring, apparently having moulted two or three times; they are then of a dull reddish brown and about 6 mm. long. As soon as the weather grows warmer, they increase in size rapidly, and, having eaten the leaf in which they have hibernated, betake themselves to the larger leaves, which they begin to eat after having made a hole near the base to let the water out and after having spun a close web over the mouth. The larva reaches its full growth about the first of May and later, when it is about 20 mm. long, of a dull carmine or brown color, lighter, sometimes white, between the segments. The cocoon is spun in the leaf of loose white silk, the larva changing to a pupa a few days after spinning. The imago appears early in June. There is a good deal of variation in the color of the females, some being much brighter than others. The following are the extreme measurements of both sexes: males, 26-20 mm., females 21-16 mm. In its habits it resembles *E. semicrocea*, generally backing down towards the bottom of the leaf when disturbed, and using its wings in ascending. I notice that the frenulum at the base of the wings is very long in this species, and, as well as I could see, the moth seems to use it when crawling up the leaf. This species is very delicate and difficult to rear."

I have never found the larva at Ottawa before the beginning of June, and they had most of them at that time moved to a new leaf, but their presence on a plant was easily detected by the brown dead patch on the leaf where they had fed the year before and which showed plainly on the outside. The leaves containing the larvæ, moreover, as often as not, had some water in them. This, of course, may have resulted from the *débris* at the bottom having stopped up the hole observed by Mr. Thaxter. On one or two occasions when the larvæ were shaken off into the water, they floated on the top and easily regained their places on the sides of the pitcher. In all instances the surface of the leaf was eaten at one place only, generally near the top inside the leaf, the outside skin being left intact. The larva is sluggish and seldom moves from its feeding ground until full grown, when it spins a loose cocoon of very fine cobwebby silk, either against the side of the pitcher or, in two instances, beneath the surface of the mass of decomposed insects and its own excreta. The web over the mouth of the pitcher, although very fine, seems to keep out quite effectually all other insects after the leaf has been taken possession of by the larva. The time of appearance of this moth is rather extended. Moths have been taken here by the first week in June, and at the same time a very small larva was found which did not give the perfect insect until the 12th of July.

The following is a description of this caterpillar when full-grown: Length, when extended, three-quarters of an inch; spindle-shaped; distinctly segmented; general outline closely resembling the larva of *Xanthoptera semicrocea*, figured by Prof. Riley on page 208 of the *Canadian Entomologist*, vol. vi., but lacking the fleshy processes of the

abdominal segments ; head and first segments small ; segments 2-7 gradually enlarging to 3 mm., and then tapering to the posterior extremity ; each segment velvety claret color, the velvety hairs only in the central part of the segments ; the intrasegmental sutures smooth, pale, in some specimens almost white ; head white, marked symmetrically on each side with three black marks, the uppermost almost round, the middle one crescent-shaped, and the lowest, above the ocelli, comma-shaped ; spiracles brown, ringed with black ; on each segment about six small black tubercles bearing slender tawny bristles ; thoracic feet and pro-legs darkened externally. When walking this caterpillar has the same half-looper appearance as the caterpillars of the *Plusias*, due to the fact that like them it has only two pairs of abdominal pro-legs. At the same time the fore part of the body is moved from side to side with a wavering motion.

Before spinning its cocoon the caterpillar ceases feeding for about a day and then spins its flimsy cocoon through which the chrysalis can be easily seen. The pupal stage lasts between 15 and 19 days. The moth when it emerges crawls up the sides of the pitcher and easily forces its way through the gossamer-like covering.

CATASTEGA ACERIELLA Clemens, SEMASIA SIGNATANA Clemens.

BY THE REV. T. W. FYLES, SOUTH QUEBEC.

In my notes on "The Season of 1893," published in the Society's last Report, I described the *Catastega* larva and pupa. In telling of the habits of the larva I said, "Then it bites away portions of the inner skin of the leaf and proceeds to make itself a case" This, without addition may be somewhat misleading.—*It makes its case of its excrementa.* The larva vacates its case, or rather *tube*, and drops from the tree about the 15th of September. The perfect insect appears in the middle of April next ensuing. The following is a description of it :

Length of body one-fourth of an inch. Expanse of wings five-eighths of an inch. Colors, grey and brown. Antennæ, filiform, grey ; palpi, large and pale grey ; face, clothed with long, pale grey, feathery scales ; eyes, protuberant, pale grey ; thorax, grey ; abdomen, brownish grey ; legs, feathered throughout, pale grey—the tarsi barred with brown on the upper side, as are also the tibiæ of the middle and foremost pairs ; primaries, pale grey, having numerous, dark-brown lines, running from the costa with a backward curve for about one-third of the width of the wing ; having also three conspicuous patches of dark brown, one—somewhat triangular—in the centre with an angle touching the costa, and one on each side of this, running from the inner margin about half-way across the wing—the base and outer angle of the wing are clouded with brown ; secondaries, brownish grey, darkening towards the hind margin ; fringes of all the wings grey.

On April 17th I sent specimens of the moth to Professor Fernald, and said :—"I dare say the moth is known under another name. If this be the case, which name will stand good ?" To this he very kindly replied. "I am in receipt of your letter enclosing specimens of *C. aceriella* Clem. which prove to be *Semasia signatana* Clem. and this last name will hold, because it was given to an imago which was properly described, and the type is still preserved in the collections of the Am. Ent. Soc. in Phil., and because the former name and description were for the early stages of some unknown insect."

NOTES ON A FEW CANADIAN COLEOPTERA.

BY W. HAGUE HARRINGTON, F.R.S.C., OTTAWA.

Hippodamia 5, *signata*, Kirby.—Fig. 31 (much enlarged) In the summer of 1893 I collected in a swampy meadow some coccinellids with the hope of obtaining hymenopterous parasites from them. In this I was not successful, but from a specimen of the species named there emerged two individuals of a small, white hair snake (*Gordius*?) about two inches long.

Brachyacantha ursina, Fab. This beetle has been very abundant at Ottawa the past two seasons, although formerly I had only found occasional individuals. During July and August it occurred commonly upon milk-weeds. About the end of April last year, in examining colonies of ants under stones, I discovered in a colony of the small brown ant (*Lasius alienus*) four larvæ which were devouring plant-lice, which were feeding upon the roots of grass after having been wintered by the ants. These larvæ were whitish and powdery, like the aphides themselves, and were 6 mm. long and 2 mm. wide tapering only slightly toward the extremities. Recognizing them as coccinellid larvæ, I secured them and placed one in alcohol. The remaining three were kept in a small jar with a few of the aphides, but they did not appear to eat any more, and a day or two later had gathered in a group and formed for themselves almost globular cocoons of white flocculent secretions, in which they pupated. The imagos emerged between the 15th and 20th June, and proved to be *B. ursina*, whose larval habits have not been described so far as I can ascertain with the literature at hand.



Fig. 31.

Antherophagus ochraceus, Melsh. This beetle is found sparingly upon flowers, such as the spiked-maple, goldenrod, etc. On one occasion I observed a humble bee (*Bombus terricola*), upon a currant bush, and evidently in trouble. Closer observation showed that some small insect had seized her by the end of her tongue, and was retaining its hold in spite of the bee's frantic exertions to dislodge it with her front legs. I secured the bee in my cyanide bottle and when she was dead found that her assailant was still attached to her tongue, and was a specimen of *A. ochraceus*. They are still together in my cabinet. Dr. Riley has, I think, mentioned this species as occurring in the nests of *Bombus*, but I cannot find the reference at present. Had the beetle in this instance merely attached itself to the bee by accident, or was it intent on getting free transportation to the bee's nest? If the latter were the case it probably intended to attach itself to the leg, and seized the tongue in mistake.

Oestodes tenuicollis, Rand. This rather pretty elater has been one of the beetles which I had always been expecting to turn up at Ottawa, but which I had never found until this summer, when several were taken upon goldenrods on an island below the city, and one also in a field in the suburbs.

Poecilnota cyanipes, Say. This fine little buprestid is rare, and only occasionally found upon willows and poplars, upon the former of which one specimen was taken during the past season.

Anthaxia aeneogaster, Lap., (*inornata*, Rand.) The habits of this pretty little species appear to be somewhat different to those of our other species of *Anthaxia*, which are generally obtained by beating trees during the summer, whereas this species usually is found earlier in the season, and nearly always on flowers, such as trilliums, etc. Three were taken on the 20th June last in the flowers of *Cypripedium pubescens*, the Yellow Ladies' Slipper.

Hydnocera difficilis, Lec. Last spring I collected a number of the small, round, flat spider nests, which may be commonly found adhering to stones. They are of a tough consistence, and somewhat glistening surface, but I do not know the name of the species which constructs them. They are frequently infested by a *Pezomachus*, the oblong cocoon of which can easily be seen when the spider's cocoon is held up to the light. From one of the cocoons which I supposed to contain a *Pezomachus* there came forth a beetle of this species. The hole cut by it was more irregular than the orifice by which the hymenopterous parasite issues, and exposed to view within the exuviae of the beetle.

Cupes concolor, Westw. Some years ago I captured one of these beetles when beating shrubbery on the edge of a small lake, but it did not turn up again until this year, when one was found in my bed-room on the evening of July 28th. It had apparently flown in the window, attracted by the electric lamp.

Saperda lateralis, Fab. On June 24th I captured near Hull a beautiful example of this elegant longicorn. My only previous capture of the species was made with a paddle as I was crossing the Ottawa. My canoe was in mid-stream when I saw a rather uncommon looking beetle flying by, and I could just reach it with the paddle, to the wet surface of which it stuck; such are the accidental captures which do not throw much light on the localities to search for further specimens.

Chalmys polycocca, Lac. This beetle was more than usually abundant the past season, and did considerable damage to blackberries, the foliage of which was often so badly riddled as to be virtually destroyed. The beetle is readily recognized by its almost globular, bronzed and corrugated body, and the grubs can be easily found, as they live in black ob-conical cases which are quite conspicuous upon the riddled leaves and stems. A number of the larval cases were collected and kept in breeding jars with a hope of securing parasites, but only beetles were obtained. From one pupa case, however, there sprouted a small slightly club-shaped fungus about 4 mm. long.

Phyllodecta vulgatissima, Linn. This beetle occurred in great abundance upon willows on an island below the city, and during the months of July and August the beetles and their larvæ almost entirely destroyed the foliage of some low-growing species. The beetle had never previously been observed in such numbers near Ottawa.

Diabrotica longicornis, Say. This insect was described in 1824 from specimens found near the Rocky Mountains, and is a common species in several of the United States, especially in Illinois, Iowa and Missouri. It has been frequently a very serious pest to corn, in the roots of which the grubs burrow. A very complete account of its life-history and ravages may be found in a report by Prof. Forbes (10th Rept. of State Entomologist, Illinois), which contains good illustrations of the various life stages of the insect. I do not find that it has ever been recorded from Canada, nor can I find any mention of the northerly and easterly limit of its distribution. It will therefore, I think, be of considerable interest to record the occurrence of this pretty little greenish beetle at such a far easterly point as the head of the Bay of Fundy. On Sept. 8th, 1890, I found it quite abundantly on the Big Tantramah Marsh near Aulac, New Brunswick, which is almost on the boundary line between that province and Nova Scotia. It may be added that these and similar dyked lands are always spoken of as the "marsh." The beetles were found upon the flower-heads of the common large thistle (*Cnicus lanceolatus*), apparently feeding upon the pollen. Thirty or more were easily secured upon a small patch of the thistles. But little corn is grown in the neighborhood, nor am I aware of the occurrence there of ragweed, in which the beetle has also been stated to breed, and it seems probable that it must find a living in the roots of some of the larger grasses.

Nacerdes melanura, Linn. This beetle, introduced from Europe, is, according to Dr. Hamilton, rather rare in America. Some years ago I captured one on a wharf in Sydney, N.S., and on June 26th last I found another on a building in this city.

Corphyra Newmani, Lec. Four or five springs ago I noticed a curious behavior on the part of this beetle. Specimens were twice found mounted upon *Melœ niger*, but for what purpose was not apparent, unless they were attracted by the oil exuded by the blister-beetle. The specimen which I have in my cabinet is dated May 22nd. It is a male, as is also the Melœ upon which it was captured. The species is not uncommon here on flowers.

Melœ sps. ? Frequently when collecting hymenoptera I find upon some of the smaller bees, such as *Halictus*, the minute triungulin larvæ of Melœ. They generally are attached to the posterior femora or to the hairs at the base of the abdomen, and several are sometimes found on one bee. One day last season I saw what seemed to me a new species of bee with a red metathorax, but to my disappointment, when I had carefully netted it, I found it to be only the very common *Prosopis affinis*, upon which more than half a dozen

of the triangulins had clustered, so as to entirely cover the metathorax. At least two species of these triangulins are common, one being yellowish, the other brownish. They occur most frequently on *Ceratina dupla* and *Halictus discus?* during the month of June. I have also found them upon the catkins of willows waiting for the visits of these bees, so as to be carried to their nests.

Barynotus Schænherri, Zett. This European weevil, which I recorded in Vol. 23, p. 21, as occurring at Sydney, N. S., in 1884, was again found there by me last September, at a point some distance from the shore where I formerly took it. The specimen was also much fresher in appearance, and there can be no doubt that the species is definitely settled there.

Otiorhynchus sulcatus, Fab., and *Otiorhynchus ovatus*, Linn., also occur somewhat commonly at Sydney, but are very much less common than the next species to be mentioned.

Otiorhynchus rugifrons, Gyll. In a dry rocky pasture where I collected one morning, this beetle was found in great abundance. Under nearly every stone several would occur, either clinging to the under surface, or upon the roots of the grasses, etc. Great quantities of the ejectamenta of toads were seen, and the pellets were composed almost entirely of the remains of this beetle, with an occasional specimen of the preceding species. Thousands must have so perished, as fifty or more were required for one meal by the toad, and I imagine that even then he got very little nourishment, in proportion to the mass of indigestible matter swallowed.

Hypomolyx piceus, De G. This fine northern weevil does not appear in our label list, although under the synonyms *H. pinicola*, Couper, and *H. pineti*, Fab., it is recorded from several points in Canada. Last year I took a dead specimen in the leaf of a pitcher-plant some 30 miles from the city (near Casselman), but to-day (17th Nov.), in searching for *Staphylinus erythropterus* I found four fine fresh specimens at the base of a larch tree, just under the moss. From the condition of the beetles and their being all on the same tree, it seems evident that they had been bred in it; the only conifers near by were larches and cedars.

Conotrachelus anaglypticus, Say. This handsome little weevil was an addition to my Ottawa list this season; six specimens having been taken on goldenrods, upon the island previously mentioned, on August 18th and 25th.

FOOD, FEEDERS, AND FED.

BY REV. THOMAS W. FYLES, F.L.S., SOUTH QUEBEC.

On the cover of that interesting magazine "Science Gossip," are represented incidents in the feud that seems to have known no truce since the beginning of created things. A fish has made a spring from the water to catch a fly, but has itself been seized, at one end by a kingfisher and at the other by a pike. Underneath, a water-insect is making every effort to escape from a dytiscus, whilst a perch is in eager chase of the pursuer, unmindful of the monster that with open mouth is close at its own tail. The consummation of such a series of efforts is described in another publication, which, with half the title of that just mentioned, makes a larger claim, viz., "Science." Dr. Charles C. Abbott tells us that he found a bull-frog (*Rana Catesbyana*) with enormously distended sides, and that on examining the contents of its stomach, he found a garter-snake (*Eutamias sirtalis*) eighteen inches long, and a field-mouse (*Arvicola riparia*). Close examination shewed that the snake was in the very act of swallowing the mouse when the bull-frog made a meal of both of them. SCIENCE, Vol. III, p. 67.

SNAKES.

I once saw a large garter-snake swallow a full-grown toad. This toad had held possession of a flower-bed in my garden. In it no doubt it had done me good service by catching various insect intruders. When I came upon the scene the snake held the toad

by one of its hind legs. There was no attempt at resistance. The toad, charmed, or overcome by terror, quietly submitted, and the snake drew in both legs of its unfortunate prey as far as the haunches. At this stage of the proceedings, regardful of the toad's services, I interfered, and disturbed the snake by poking it with my walking-stick. It glided away; and I supposed, of course the toad would make off too. But no, it drew itself together and sat, as stolid as Mark Twain's celebrated frog. After a few minutes the snake came sidling back again. It rubbed its head on the ground, first on one side and then on the other, with the fawning motions of a kitten, and so approached the toad which remained apparently quite apathetic. It seized it by the hind legs as before. The gorging process went on smoothly until the trunk of the toad was reached—then came the strain! I could see the upper jaw of the snake cautiously raised and slightly protruded. Then fresh hold was taken, and the bite with effort secured. As this process was continued, the forward part of the toad's body was more and more distended with the displaced viscera and compressed air. By and by the fore-legs of the toad stuck out angularly, one on each side, and seemed to offer insurmountable difficulties—but no, they in turn were engulfed; and the last motion I saw of the unfortunate victim, as its face was drawn in, was a solemn wink, which seemed to say, "It's all right, my good Sir; it will be worse for the snake than for me. I'll give him a horrible fit of indigestion!" The whole process occupied exactly two hours. How long the toad would live in the snake's inside it is impossible to say. Two naturalists, out on a collecting tour, captured a snake a little more than a yard long, which had a peculiar lump in the middle. Whilst carrying the snake homeward by the tail, they noticed that the lump gradually approached the head. They hung the reptile to a tree still with its head downwards, and awaited developments. The mouth slowly opened, and a large toad covered with a greenish slime dropped out. After some minutes the toad recovered, "and was seemingly little the worse for its imprisonment." SCIENCE GOSSIP, 1874, p. 68.

The snake is not always a conqueror, it is sometimes, as we have already seen, a victim. I have seen a pigeon-hawk (*Falco columbarius*) pounce down upon and fly off with a garter snake; and, stranger still, I have seen a hen shake out a red-bellied snake (*Storeria occipitomaculata*, Baird and Girard,) as one would snap a whip, and then gobble it up—beating back her chickens with her wings meanwhile. The air of complacency, befitting one who had done a virtuous action, with which she afterwards strutted off with her brood, was a thing to be remembered.

Besides the snakes above-mentioned we have in the province of Quebec two others that are frequently met with—the riband snake and the water snake, and two which seem to be local and rare—the milk snake and the grass snake.

The milk snake (*Coronella eximians*, De Kay) is found on the hills bordering upon Vermont. I have taken it on Shufelt's Hill which overlooks the village of Sweetsburg. It is an exceedingly beautiful creature. Its body-color is fawn, softening down to white underneath. All along the back and sides are irregular blotches of rich warm brown bordered with very dark brown.

The grass snake (*Cyclophis vernalis*, De Kay) I have met with only in the neighborhood of Quebec. Two years ago I found a dead specimen in the road near the English Church at New Liverpool; and last summer I captured the living snake on the Island of Orleans. The circumstances of the capture were these: I had drawn down a branch of a young ash-tree to examine it for larvæ, and I was conscious of the fall of a rather heavy body. I glanced down, and at my feet was the snake just making off. I took it with my net, and examined it closely. It was about one foot eight inches long. In form it was very elegant; and its color was a delicate pea-green, without spots or markings of any sort. Underneath the hue was somewhat paler, much like that of the down on the body of the Luna moth. The eye of the snake was black, and its glance was as mild and innocent as that of a canary bird. While I was debating in my mind how I should carry it home—for I had no box with me large enough to hold it—it found a hole in the bottom of my net, escaped through it, and glided into a clump of young thorn-bushes and I saw it again no more. It frequents the trees to catch young birds and insects.

But it is when we come to interview the insect tribes that we find the most astounding series of gastronomical accommodations. One insect fattened upon another is destined to become food for a third, which in turn must fall a prey to a fourth. Consider the

SPIDERS.

We have been taught to look upon the spider as an embodiment of successful villainy—of cold-blooded calculation. We hold in abhorrence its stealthy steps to entrap the innocent and unwary.

“ Will you walk into my parlor ?
Said the spider to the fly ;
'Tis the prettiest little parlor
That ever you did spy ;
You only have to pop your head
Just inside of the door,
And you'll see so many curious things
You never saw before.”

Oh, the old reprobate ! How much satisfaction it affords us to think that the black-headed Tit (*Parus atricapellus*) and other birds snap up without hesitation this betrayer of the innocent. But birds are not the only avengers upon its footsteps. Numerous insects make it their prey. Even that monster spider *Mygale Hentzii* (Fig. 32) of California finds a Nemesis in the “ Tarantula Killer,” as it is called, the *Pompilus formosus* of Say. (See the “ American Entomologist,” Vol. I, p. 129).



Fig. 32.

Some years ago I paid a visit to the Compton Ladies' College, which was then under the care of its public-spirited founder, the Rev. J. Dinzey and his excellent wife. I found in the cupola of the building a number of cells of a species of mud-dauber wasp, probably *Pelopæus cemetarius*, Linn. The insects had vacated their quarters, but there remained in the cells the skins of the spiders on which they, in their larval stage, had fed. Now nature abhors waste, and on these skins a number of small beetles of the species *Ptinus fur* Linn, were battenning.

The mother mud wasp after building a cell crammed into it a number of spiders which she had paralyzed with her sting. Having provisioned her nest she laid an egg in it. The business of the larva that hatched from this egg was simply to make a long feast on the fresh food stored up for its use. But Walsh tells us that the larva is not in every case left undisturbed in this pleasing occupation. An ichneumon-fly (*Cryptus juncus*, Cress) sometimes pierces the wall of a cell and ejects an egg, the larva from which proceeds to dispose of the rightful occupant. Commenting upon this Walsh says: "Thus the spider preys upon flies, the mud-dauber upon the spider, and the ichneumon-fly upon the mud-dauber. 'Kill and be killed; eat and be eaten.'" This is the great universal law of nature." "American Entomologist," Vol. 1, p. 137.

I do not like to dismiss our friend *Ptinus fur* without further notice. He is small but he likes high living. He is a fellow of wonderful appetite! I think he outdoes in that respect the famous ostrich which indulged in ten-penny nails and broken bottles, or the African chief who despoiled a party of travellers of their supplies and was seen to eat up a pot of blister salve. It affects the dried specimens in our cabinets seasoned with oxalic acid and verdigris. Curtis found it eating an old coat; and it has been known to thrive on such gentle stimulants as *Nux vomica* and capsicums.

Not only are spiders exposed to dangers from without,—sometimes they suffer from "terrors within." The hair-snakes have been known to make use of them as hosts.

HAIR-SNAKES

are plentiful in the Province of Quebec. The most common of them is *Gordius varius*.

The Rev. E. A. W. King, of Waterville, obtained a worm of this species, and placed it in a dish of water, that he might observe its motions. In a short time it commenced to lay its eggs. They were in the form of a white thread, many inches long, which was gathered into a loose tangle, and through and about which the worm entwined itself, as if to hold it in safety. He did not wait for the eggs to separate and hatch, but consigned the string and the mother worm to a bottle of alcohol.

I have obtained a male *Gordius* from a larva of *Zaræa Americana*, and a White Hair-snake 10 inches long from a Lepidopterous larva, that in length, was but an inch and a quarter. The creature lay closely curled—like the spring of a bird-trap—under the skin of its victim.

Hair-snakes are often met with in strange places. A lady in Montreal, feeling thirsty in the night, took a glass and filled it from a tap in the bath-room. While drinking she felt a tingling sensation on her lip. She paused—struck a light—and to her disgust found one of these creatures in the tumbler. (Moral: Look before you drink).

I lately heard an advanced version of the old myth of the horse-hair in the water. A gentleman accompanied a hunter on an excursion in search of moose. The hunter looked carefully into every stream they came to, and, at length, discovering Gordii, exclaimed joyfully, "Yes, moose have been here—here are hairs from them turned into snakes."

The history of the hair-snake is not yet completed. The adult worm—its form and structure—its nervous, muscular and reproductive systems, have been fully described. Its mouth is said to open upon a gullet which spreads out upon the upper end of the cellular tissue which extends through the whole length of the worm (Dr. Meissner, quoted by Dr. Leidy, "American Entomologist," Vol. II, p. 195.) Its food, which has (it should be remembered) already gone through the digestive organs of its host, is passed "by endosmosis from cell to cell" and is completely assimilated.

The eggs, the embryos, and the newly developed Gordii have all been described. The last have been seen to enter the bodies of the larvæ of Ephemera, and have been found in them *encysted*. But, between the notice of them in that condition and the record of the perfect worm, there is a gap in the history. It remains for some careful Helminthologist to fill up the hiatus. It is believed that the Gordius is one of those creatures that have to pass from one host to another (like the Trichinæ) before they can

reach their perfect state. We can understand how it could pass in the May-fly to predacious insects, such as the spider and the ground-beetle, but not so readily how it could find a second host in a vegetable devourer, such as the locust or the caterpillar. It may be that the encysted worm is cast off with the pseud-imago skin of the fly, or that it survives the decay of the fly itself, and, being caught in the herbage, is taken in by some hungry herbivorous insect. The chances against it, in this case, seem to be very great. Still, when we remember the vast number of eggs laid by one female *Gordius*—they have been estimated at more than six millions and a half—we must allow that there is a very broad margin for failures; and that if only a small percentage of the brood arrives at perfection, there must be a very great number, indeed, of hair-snakes that run the full length of days allotted to their kind. In the case of the tape-worm, *Tenia solium*, we know that the ova survive the decomposition of the ejected proglottides or divisions of the worm, and are swallowed by hogs and sheep as they feed upon the vegetation.

Another kind of creatures that affords us much food for reflection is the

APHIDES.

One day in July of this year I found two patches of these "plant-lice" on the broad Windsor beans growing in my garden. My first impulse was to destroy the intruding insects, but entomological curiosity overcame horticultural prudence, and I made up my mind to allow the insects to run their course. By the end of August there was not a stalk in the double row of beans (which was 12 yards long) that was not black with aphides. The insects clustered especially on the topmost leaves, and among the flowers, and along the edges of the pods. The winged brood of the species appeared in the middle of September.

The number of familiars and foes that resorted to this colony of aphides was truly amazing. First there were the ants busy about their "milch cows"—as the old naturalists called them. It was amusing to see a cunning ant approach an aphid and caress her daintily till she—either indignant at the liberties taken with her, or tickled to death with the fun—ejected the precious drops that the ant was longing for—for the love of the ant for the *Aphis* is simply cupboard love.

At least four kinds of lady-birds employed themselves in lessening the numbers of the aphides:—The Thirteen spotted, Fig. 33, (*Hippodamia tredecim-punctata* Linn.) the nine-spotted, Fig. 34, the beetle, fig. 35 larva, (*Coccinella novem-notata*, Kirby,) the five-



Fig. 33.



Fig. 34.



Fig. 35.



Fig. 36.

spotted, fig. 36, (much magnified,) (*C. quinque-notata*, Kirby,) and the two-spotted, (*Adalia bipunctata*, Linn.) The handsome larvæ of these species might be seen driving their snouts into the ill-fated aphides, and after a while casting them off "flaccid and drained." The coccinellidæ are among the gardener's most useful insect friends, but they are not always duly appreciated. A gentleman saw a gardener busily employed in picking off the Lady-birds from his plants and treading them under foot. "What are you doing that for?" he asked. "Well, sir," was the reply, "you see these nasty red things—them's the old uns; you see these little green things—them's the young uns just hatched. I'm killing the old uns fust, and I'll tackle the young uns arterwards."

Attracted, by the aphides, and the honey-dew which they ejected, innumerable two-winged flies buzzed daily about my beans. On one occasion I counted fifteen different sorts. Conspicuous amongst them were, *Eristalis tenax*, Linn, the Drone Fly (so called from its resemblance to the male of the honey bee); a pretty black and yellow Syrphus Fly, *Eristalis transversus*, Wiedeman; *Volucella erecta*, Walker, easily distinguished by the brown patch in its wings; *Tachina vivida*, Harris, a bustling showy insect with a large orange-red abdomen set with black bristles; the Flesh Fly, *Sarcophaga*

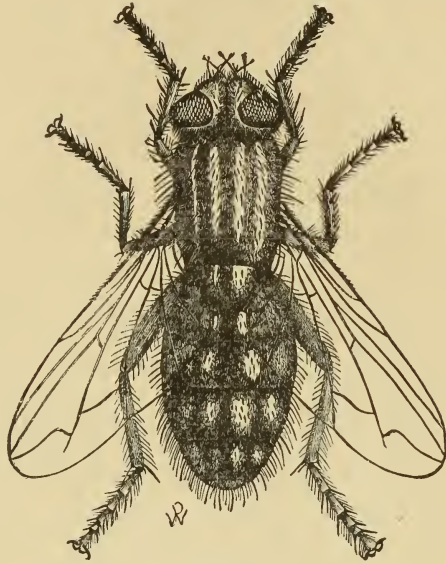


Fig. 37.

vannaria Linn, Fig. 37, (highly magnified,) large, red-eyed, with striped thorax and mottled abdomen—grey and black; the Green-bottle Fly, *Musca Cæsar*, Linn; the Blue-bottle Fly. *M. vomitoria* Linn, and a species of *Scatophaga*.

Less abundant as regards individuals, but more numerous in point of species were the Hymenopterous insects that frequented that row of beans. The following is a list of twenty different kinds of them captured during the month of September with the cyanide bottle only:

Adynerus tigris, Saussure.
Philanthus bilunatus, Say.
Crabro singularis, Pack.
Monedula ventralis, Say.
Aphilanthrops frigidus, Smith.
Pompilus atrox, Dahlbom.
Hedychrum violaceum, Lepell.
Ichneumon comes, Cresson.
I. latus, Brulle.
I. flavizonatus, Cress.

I. jucundus, Brulle.
I. creperus, Cress.
I. paratus, Say.
Trogus Copei, Cress.
Amblyteles indistinctus, Prov.
Opion purgatum, Say.
Opheteles glaucopterus, Linn.
Bassus leatatorius, Fab.
Pimpla pedalis, Cress.
Sampronota Americana. Cress.

A few words on

INTERNAL PARASITES.

The lowest types of these with which we are acquainted are the Gregarinidæ which are found in earth worms and other annulids. The gregarina of the earth-worm consists of a transparent capsule filled with a colorless, semi-fluid, granulated mass, in one part of which a well-defined nucleus appears. The creature has no digestive apparatus—it lives by absorption of fluids through the capsule. When two

Gregarinæ meet they adhere one to the other, and then surround themselves with a cyst. The partition between them disappears; the nuclei also disappear and then the case becomes filled with spindle-shaped bodies called "pseudonavicellæ," which in due time escape from the cyst into the surrounding medium. Their after history is not yet told.

It is said that when a gregarina finds itself left in a state of single blessedness it does not give itself over to despair, but proceeds to encyst itself, and to produce pseudonavicellæ on its own account.

The internal insect-parasites of insects are of two kinds: (1) Those that complete their metamorphoses within their victims; and (2) Those that leave their hosts on the completion of the larval stage.

Of the former, *Rhogus intermedius*, Cress, affords us an example. It assails the larvæ of *Apatela hastulifera* Abbot and Smith, which feeds upon the alder *Aldus incana*, Willdenow.

The parasitized *Apatela* larva may be found in the autumn attached to the leaves and stems of the plant. In them the ichneumon grubs, having attained their growth, form their thin, brown, closely-woven cocoons, which are arranged at an angle of about forty-five degrees, and usually in four rows. I have drawn out with a setting-needle no less than thirty-five pupæ from one caterpillar. They were all placed with the head upward. Very regular rows of round holes show how the adult ichneumons escape from their nurseries. As I have found the flies at large in the middle of October I presume that some of them, at any rate, pass the winter in the perfect state.

There are much larger insects that undergo all their changes within their hosts such as *Ophion macrurum*, Linn, Fig 38, in the Saturniadæ, *Opheteles glaucopterus*, Linn, in Cimbex. The eggs of these are laid singly or in pairs.



Fig. 38.

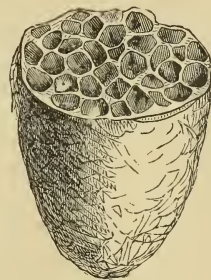


Fig. 39.

Of parasites that leave their hosts when full fed and before undergoing the pupal change *Apanteles longicornus*, Prov, is an example. The fluffy, yellow masses of the cocoons of this species may often be seen attached to the remains of noctuid larvæ, under the rails of fences, etc.

What entomological neophyte has not experienced the disappointment of finding, on a sudden, a carefully tended Sphinx caterpillar in a state of collapse, and bristling with the larvæ of some microgaster, that have extruded themselves from it, and that proceed to spin their cocoons about its remains.

But surely the most economical of all the internal insect parasites is the well-known *Cryptus extrematus*, Cress. The larvæ of this insect find themselves, they know not how, in the inside of a caterpillar of *Platysamia Cecropia*, Linn, and forthwith commence the herculean task of reversing the state of things in which they find themselves, and of environing their environment—putting the outside grub into their insides—beginning with the fatty portions of it. Numbers and perseverance accomplish the task, but not

before the caterpillar has spun its wonderful cocoon. When this is finished the *Cryptus* larvæ, finding no more fat in preparation, hold a grand carnival on the vitals and frame of their host, and then spin their own cocoons within the snug winter quarters prepared by their unhappy victim. In them they lie through the winter as snugly packed, Fig. 39, as herrings in a barrel or sardines in a box.

CANNIBALS.

Among insect feeders upon insects the "Cannibals" must not be passed by. Of English caterpillars that have a bad reputation as such, *Thyatira derasa*, *Charactea Delphinii* and *Cosmia trapezina* are well-known examples. With *Mantis Carolina* Linn, the nuptial embrace has been known to end in the death grip, and the female to make a wedding breakfast of her spouse.

But the most startling story of all was told by J. F. Stephens, author of "Illustrations of British Entomology." He said that having turned the tail of a dragon-fly round to the head he saw the insect make a meal of four joints of its own abdomen. (See *Ent. Mag.* 1., p. 518). If this story had not come from so good a source, we should have thought it of like kind to that told of the Irishman, who, having disturbed a mud-turtle, "saw the baste swallow its own head."

There remains one other sort of devourers of insects that I wish to notice before concluding my paper.—it is

FUNGI.

We are accustomed to the idea of insects feeding upon vegetables, but that of vegetables feeding upon insects is not so familiar to us.

A fungus that has excited much interest amongst naturalists is the *Sphaeria Robertsiana*, which grows in, and out from, the caterpillar of a New Zealand Ghost-moth, *Hepialus virescens*. This caterpillar undergoes its pupal change in the soil. But it often happens that a spore from the *Sphaeria* finds a lodgment upon the body of a *Hepialus* caterpillar—usually between the head and the segment following—and, vegetating there, penetrates to the creature's inside. The animal contents of the caterpillar are by degrees exhausted by the fungus, and the skin—which retains its perfect form—becomes filled with vegetable tissues. At the same time one or more sprouts from the fungus rise through the soil, and into the open air. Fig 40. The sporules are formed round the top of this shoot, which is sometimes ten inches long. The parasitized larva is called by the Maories "Hotete." It is sought for by them and greedily eaten. It is said to have a nutty taste.

There is a fungus of somewhat similar habits that affects the larvæ of the May-beetle, *Lachnosterna fusca*, Fröhl. It is found at Quebec.

In my paper entitled "A Day in the Woods," published in the Society's twenty-first Report, I told of a fungus *Entomophthora grylli* var. *aulica*, Fres, that was destroying the caterpillars of Arctians of different kinds. This fungus is still destructive. It affects particularly the larvæ of *Leucarctia Acroea* Drury and *Spilosoma Virginica*, Fabr.

It may be that our meadows have been preserved from depredations, such as those described by Harris, under the head of "The Salt Marsh Caterpillar,"—"Insects Injurious to Vegetation," p. 351), by the agency of this fungus.

Time would fail to do justice to my theme—a volume might be written on every division of it; but I trust that I have said enough to awaken interest, and to stimulate research.



Fig. 40.

AN ATTACK OF EPHESTIA INTERPUNCTELLA.

BY H. A. STEVENSON, LONDON.

Attack.—Slender white or pinkish cylindrical caterpillars from one-half to three-quarter inches in length, with reddish-brown heads; a dark brown stripe runs along the side. The caterpillars were found feeding on raisins, prunes, rice, currants, dried apples, and wherever found they could be traced by whitish silk threads or webs. The caterpillars, when full-grown, spin close whitish or greyish-white cocoons about a half-inch long and one-sixteenth of an inch in diameter. When the caterpillars emerge from the cocoons they are a narrow rolled-up-like moth, and are a brownish-grey color with a golden lustre. A more complete report of this insect is contained on page 77 of Mr. Fletcher's report in the Experimental Farm Reports for the year 1889.

On August 17th I was called to a wholesale warehouse in this city (London), where they said they were troubled for the last three days with a small moth, which was increasing very rapidly. When I went down there these small moths were flying all over the warehouse in great abundance, from the cellar to attic; they were even on the outside of the front door, and they had originally started at the back door. I asked them where they came from, and they replied that they did not know where they came from, as the first were observed only three days before, so, after looking over the place I came across a shipment of Sultana raisins behind the back door and alongside the elevator. There were about 500 boxes, and the boxes were almost covered with the caterpillars and the moths. The moths were flying about in great abundance. A great number of the caterpillars had fallen down the elevator into the cellar, and some had also climbed up the supports of the elevator into the upper stories. The caterpillars had also penetrated into the adjoining rooms, and were swarming over the tea chests in great numbers—in fact, were into everything.

The raisins had been imported from Smyrna by Liverpool and Montreal, on October 20th, 1893, and had remained in the warehouse since then.

In three days from the time they were first noticed they had swarmed all over the warehouse.

Remedies—I recommended that the raisins and the tea chests, which were swarming with the caterpillars and moths should be placed in some large boxes which were air-tight, and in which some bisulphide of carbon had been exposed in open dishes and left for a time. The moths and caterpillars on the tea chests soon fell off, as they had not penetrated into the interior. But the raisins were left over night in the boxes and the pests were soon destroyed. The firm tried spraying the place with the bisulphide, but it dissolved all the rubber atomizers used.

At night some bisulphide of carbon was exposed through the different parts of the warehouse, and the proprietor collected the keys from the different employees and cautioned them about the use of lights, as the bisulphide of carbon is very inflammable, and the whole warehouse was swept thoroughly through with a good stiff broom.

The raisins were unpacked and picked over and thoroughly cleaned and reboxed again as good as new. I have been in the warehouse several times since, and have not noticed the recurrence of the insect.

Thanks are due to Mr. Moffat, who at once identified the insect and compared it with the specimens in the Society's collection. And thanks are also due to Mr. J. Fletcher, of Ottawa, to whom specimens were sent, which he identified as *Ephestia interpunctella*, and also for his immediate reply concerning the destruction of the pest.

THE ECONOMIC VALUE OF PARASITISM.

By F. M. WEBSTER.

In the term parasitism, as here used, is included the preying of one organism upon another, whereby the latter is largely kept within normal, numerical bounds, or is reduced to such conditions when it rises beyond them. Or, in other words, the preying of certain so-called beneficial insects upon others called destructive, and the action of fungoid growths upon such destructive species. Parasitism, in its broadest sense, has been aptly termed the balance wheel of nature, because of its similarity in effect to the mechanical contrivance bearing that name, which is instrumental in equalizing the irregularities of motion, in the machinery of which it is a part, and hence dependant upon the same source for its motive power.

The effect of vegetable devouring insects is to prevent the encroaching of one vegetable upon another, lest the latter should be exterminated: and the insect and fungoid enemies of such vegetable-feeding insects prey upon them in order that they do not themselves carry their work to such an extent as to exterminate the plant they are only designed to restrict. Thus we have a plant being fed upon by a species of insect, which insect is being kept from exterminating this plant by its own or primary parasites, and these in turn are kept from destroying all of the plant-feeding insects by still other parasites, known as secondary parasites, and these also have their parasites, known as tertiary parasites, and besides are more or less influenced by meteorological environment. To make the matter still clearer, it is as if a number of men were sent to prune an orchard, and a superintendent sent with them to see that the task was not over-done, he too, being amenable to still other authority.

Now, both plants and insects are capable of reproducing far beyond the number of young ordinarily required to keep these elements in equilibrium; but when, from any cause, one of them becomes abnormally reduced, this reserve reproductive force is brought into play, and the weakened element is thus soon able to regain its normal numerical power, but is restrained from going beyond. We thus have a huge piece of natural mechanism, self-regulating and self-adjusting, the balance wheel of which is parasitism.

Under perfectly natural conditions and uninfluenced by man, all of these natural organisms work in unison, as above indicated, and a temporary disarrangement of any one element, due to outside causes, such as the weather, is soon readjusted with little more disturbance to the others than would result to the Gulf of Mexico from the dropping of a pebble into the middle of the Atlantic ocean. In some cases a few plants might be killed throughout the local areas, but these would soon be replaced by others. But the husbandman now appears and upsets this equilibrium by destroying hundreds of species of plants over an area of millions of acres, and in their stead replacing but one. He causes a thousand apple trees to grow where nature intended but ten should exist. He causes the ground to produce a thousand grain plants, where nature intended but one to grow, and to produce seed far in excess of nature's requirements. The result is that the insect enemies of these cultivated plants, or such insects as can feed upon them, are greatly increased in numbers, because more of the young find a sufficient amount of food to develop them, and because they are needed by nature to counteract the influence of man. Later, the parasites, both primary, secondary and tertiary, increase for precisely similar reasons, and in obedience to the same laws, though, of course, they follow more or less distantly the movements of their hosts. From the fact that their movements do follow more or less distantly the ebb and flow of their respective hosts, the question of the economic importance of their influence has remained unsettled, and, by some, has even been doubted. When we come to consider that but an exceedingly small percentage of the movements of these insects ever reaches the eyes of even the most observing entomologist, and of the interactions of these organisms we really know but very little, it will be observed that to estimate the economic value of their influences is a very difficult task, if one expects to be just and secure the actual facts. A millionaire, in one of our larger cities, may replenish his purse at the bank each morning and go about among the poor, supplying to the needy a coat here, a pair of shoes there, a break-

fast in one place and a supper in another; medicine for one sick mortal and medical attention for another; and go on in this way for years without being known outside of his own city, especially if he does not choose to advertise his generosity. But let him once fall into the clutches of a dissolute woman whom he may have, out of pity, befriended, and he will be publicly introduced from one side of the continent to the other, and the student of human nature will, indeed, have to be exceedingly guarded in his conclusions if he expects to get an unbiased estimate of this man's character, based only on the facts thus placed in his possession. Yet it seems to me that he is in as proper position to do so, as is even the working entomologist to pass upon the value of parasites in overcoming an invasion before more or less financial loss has accrued, basing his judgment upon the failures to do so that have come under his observation, and necessarily leaving what he does not see out of consideration. I do not believe anyone, be he ever so good an observer, can, within the space of one life time, collect data sufficient upon which to base the statement that "they usually appear in force only after the damage is done." Twenty years of close observation of insects, in the fields, leads me to make this statement; and I venture to say that in ninety-nine cases out of one hundred, an invasion of an injurious insect will attract the attention of an ordinary entomologist only when its parasites fail to overcome it before it has caused monetary loss. If the entomologist does not see them, how much more likely is the ordinary farmer to note these conflicts between parasites and hosts? It is the failures that usually first attract our attention, while the successes are more often unobserved, and, such being the case, how can we, with justice, weigh evidence we do not possess, and of the magnitude of which we can have little conception.

Now, I will give a few personal observations relative to this matter, which illustrate the fact that thousands of similar cases might pass unnoticed, even by those possessing fair abilities for seeing such things.

Ten years ago, in Indiana, I was studying wheat insects, and found the Wheat Midge larvæ, *Diplosis tritici*, exceedingly abundant in a number of fields; enough so to threaten serious injury to the crop. Soon after I observed these, considerable numbers of *Coccinellidæ* and *Telephoridæ* were running about over the heads of the wheat, thrusting their own heads down among the bracts, and feeding among the maggots of the *Diplosis*. Some of the *Telephoridæ* were venturesome enough to thrust their heads among the bracts in order to secure such of their prey as were exposed by the bending of the head as it swayed in the wind and were caught by the wheat head suddenly returning to an upright position, and if a breeze did not soon release them, paid the penalty of their temerity with their lives. Thousand of these carnivorous beetles were present, and they must have destroyed millions of the *Diplosis* larvæ, in the ten days to two weeks they were observed at work, and no perceivable injury resulted from the invasion of the midge.

A few years later a couple of coniferous trees on the campus of a western University were attacked by a scale insect, *Mytilaspis pinifoliæ*, if I recollect correctly, and by mid-summer the leaves had a decidedly whitish tinge, as if sprayed with a dilute whitewash, and besides, took on a sickly look. In the meantime a colony of *Chilocorus bivulnerus*, or Twice Stabbed Lady Beetles, (Fig. 41), as they are commonly called, took up their abode on the trees, deposited their eggs and with the larvæ from these (Fig. 42) began to destroy the scales. All through the autumn the contest was waged, and with the coming of cold weather all the beetles, which had long before escaped from their pupa cases, went into winter quarters. With the coming of spring they were observed to return to the trees, and again began the contest in turn giving way to their larvæ, and these emerging as adults. In early summer the ends of the branches began to show leaves free from scales, and by the coming of winter again the outbreak of the pest had apparently been entirely overcome, and the fall rains washed off all vestige of the conquered hosts. The invasion had been overcome, and I doubt if another person besides myself had been aware of the two years' conflict.

Later, the maples along one of the principal residence avenues of Columbus, Ohio, were threatened with an invasion of the Maple Bark Louse, *Pulvinaria innumerabilis*, (Fig. 43), and the trees would certainly have been overrun the following year, had not this same Lady Beetle appeared in numbers, and with their larvæ so reduced the pest in numbers as to render injury impossible.

The appearance of the Grain Aphis, *Siphonophora avenae*, in such enormous numbers, during some seasons and the almost total absence of them during others, are matters of continued observation, but the causes therefor are not well understood. The present season, there was, quite early, indication of an outbreak of this species, but later it largely disappeared, while the cause for its doing so is obscure. Now, with all the light on the subject that I have been able to gain from several years' study of this insect, I am about convinced that the secret lies in the condition of the weather during spring; that



Fig. 41.



Fig. 42.



Fig. 43

cold, wet weather, at that season retards the development of their Hymenopterous parasites, by which they are largely held in check, but does not retard their own development to the same extent, thus giving them an advantage, early in the season, which is sometimes not overcome until much later and after the aphid has worked some injury. One other observation and I am done, though if space would allow, and time permitted me to go over my note books, I could multiply the number by at least fifty.

Late in April and early in May of the present year, there was considerable consternation among the farmers over a large portion of the State of Ohio, caused by the appearance of enormous numbers of the larvæ of the Clover Leaf Weevil, *Phytonomus punctatus*, in the clover fields. These larvæ were literally swarming and eating the plants to the ground, which, together with the drouth prevailing at the time over the northern portion of the State, gave matters anything but a favorable appearance, and it seemed that many fields could not escape ruin. In fact, an occasional farmer was frightened into plowing up his fields. But just here a fungous disease, *Entomophthora sphaerosperma*, Fresn., appeared and the effect was astounding. Farmers who had about given up all hope of a hay crop, wrote to say that the worms were all dead or dying and they could not find a live one. One farmer, who came in to consult me about breaking up his field, came a few days later to say that all the worms were dead or dying, and I found a close search was necessary to find a healthy one of any size, and but few of even the youngest. Now, I do not believe a million dollars would cover the saving to the hay crop of Ohio, by this minute fungus, the present year. But this is not all. Soon after, rains occurred and the effect of the worms resulted only in retarding the blooming of the clover, precisely the effect of mowing or pasturing when done to prevent the depredations of the Clover-seed Midge, *Cecidomyia leguminicola*, and whether the result was the same or not, the farmers over the area covered by this Leaf Weevil, harvested a good crop of clover seed.

As previously stated, I do not even pretend to have observed a one-thousandth part of similar instances that have been going on in every locality each year. And I repeat again, it is the cases where parasites fail to overcome a destructive insect, before it occasions financial loss, that are the exceptional ones, and the nature of these failures is such that we see and recognize them far more readily than where the reverse is the case. It is the damage that we see, and this being the case, how can we see it before it exists? Not only this, but I believe the great fundamental principle involved in the use of insecticides is to assist parasites in doing their work; and as we get to applying them more and more intelligently, we shall watch for the exceptional cases where parasites are weak in numbers, and by artificial methods, seek to offer a substitute for the lack of numerical strength.

A RE-APPEARANCE OF *PIERIS PROTODICE* BOISD.

BY J. ALSTON MOFFAT, LONDON, ONT.

On the 18th day of October, 1894, I received a *P. protodice* from Mr. C. Anderson, a young collector of London, who has done some excellent work during the past summer, by sugaring in his father's garden. A few days previously he had called on me to say that he had seen on the street a white butterfly that was new to him. Failing to recognize his description of it, I showed him the drawer containing the *Pieris*, when he at once pointed to the female of *protodice* (see fig. 15) as like what he had seen. I gave him some information about the peculiar history of that butterfly which excited his interest, and he determined to make an effort to obtain some of them. With that end in view, he went on the 17th to a locality which he thought was the one most likely for them to be found in, with the result that he secured a pair of them, and when he showed them to me on the 18th they were yet alive. This is the first living pair of that butterfly that I have seen since the autumn of 1872, when *Pieris rapae*, the imported cabbage butterfly appeared on the stage to act its part, whilst the native one retired from view.

In 1887, Mr. S. H. Scudder, of Boston, published a most interesting account of the introduction and spread of *Pieris rapae* from 1860, the year in which Mr. Couper captured a few specimens at Québec, where it is supposed to have been landed, and the first reported to have been seen on this continent, to 1886, when it had reached the Rocky Mountains. This history of the introduction and spread of *P. rapae* is full of interest and importance to the cultivators of some of the most valuable products of the field and garden; but the fact, that as the imported *rapae* advanced the native *protodice* disappeared, has ever seemed to me to be one of the most singular and interesting events in natural history that has come under my observation.

I have seen the statement made by various writers, that *Pieris oleracea*, also native, has disappeared from their locality on the advent of *rapae*. This does not accord with my experience. *Oleracea* I always found to be confined to certain locations, periodical in its appearance and never very plentiful; and so it has continued to be. But *protodice* used to be more or less abundant every autumn until *rapae* came, when it totally disappeared from my field of observation.

Mr. Scudder in tracing *rapae's* gradual spread westward, says: "In 1873, as before stated, it reached Port Hope, and 'F. C. L.' reports taking his first specimen at Dunn in Haldimand county, Ontario, (Can. Ent. vi. 60), and some were taken at Hamilton (J. A. Moffat), where one would have looked for it the preceding year from its presence then at Toronto."

I have always felt quite certain that *rapae* was present at Hamilton during the fall of 1872, although I did not notice it. My attention was arrested that season by the unusual abundance of cabbage butterflies, which I set down without examination as

protodice. Not being informed about the advance of *rapæ*, I did not suspect its presence until the following winter, when upon a visit to Dundas I saw specimens of it in Mr. Kyle's collection which he had captured in his own garden the previous summer without suspecting that they were other than a variation of the native *protodice*. So that if I had examined closely, I have not the slightest doubt but I would have found *rapæ* helping to swell the numbers that so attracted my attention during the autumn collecting; confirming Mr. Scudder's expectations. Moreover, I found *rapæ* in the spring of 1873, indicating that it must have been present the previous fall. From that onward, I saw no more *protodice*, their place being taken by *rapæ*. And this I believe corresponds with the experience of Canadian collectors.

I have never seen this sudden and total disappearance of *Pieris protodice* satisfactorily accounted for. When I have seen the subject touched upon, it has usually been dismissed with a reference to "the struggle for existence and the survival of the fittest," which does not seem to me to apply in this case at all. The breeding habits of the two differ considerably; the native *protodice* was quite content to make use of the natural products of the soil for its purpose, whilst the imported *rapæ* attacks first, and in preference to all others the cultivated ones. So there need have been no "struggle" between the two on that point, as there was plenty for both, and as the larvæ of *rapæ* had an abundance of vegetable food to its liking, it would not devour that of the other even if it had met with it on the same plant. As that theory does not account for the disappearance of *protodice*, I have to look for one that will meet the requirements of the case.

It is a well-known principle in biology, that there are races of animals of the same species, that are possessed of different constitutions and dispositions, and that there are in nature, external influences at work which, acting upon the living organism will produce such differences. That in some instances, such differences manifest themselves geographically, and are spoken of as geologic and climatic, or as pertaining to the soil and climate. That races may differ in strength of constitution and character according to the part of the globe to which they belong. And that a strong race commingling with a feeble one, will impress its peculiarities upon the results of such a union and make its controlling power manifest.

Now it is generally admitted, that the life of Europe is of a more vigorous, tenacious and aggressive character than that indigenous to this continent; therefore I come to the conclusion that *protodice* and *rapæ* are but different races of the one species, and that when they met and commingled, the stronger constitution and proclivities of *rapæ* prevailed, and the outcome of the union were all stamped unmistakably *rapæ*, the characteristics of *protodice* being completely absorbed and obliterated. This seems to me to be quite sufficient to satisfactorily account for all that has occurred in connection with these two butterflies, and if it is correct then the probability amounts almost to a certainty, that, sooner or later *protodice* will return. This is not a prophecy, but a simple deduction from the well-known laws of nature; for the external influences that produced the typical *protodice* and brought it into harmony with its environment at first are still at work, and working in the same direction. Therefore, when these external influences have had sufficient time to work their utmost upon *rapæ*, and no fresh importations take place, a reversion to the original type will be brought about as a matter of course.

In seasons of its greatest abundance, *protodice* never caused any serious injury to cabbage, in this northern portion of the continent at least. Its larva was quite content to feed upon the loose outside leaves of the plants, and so did but little harm; but the larvæ of *rapæ* will eat their way into the solid heart of the largest heads, injuring them greatly, if not ruining them utterly. If then *protodice* should return with its original disposition unimpaired and supplant *rapæ*, it will be a welcome transformation to the cultivators of that useful vegetable.

REMARKS ON THE STRUCTURE OF THE UNDEVELOPED WINGS OF
THE SATURNIIDÆ.

BY J. ALSTON MOFFAT.

I have had an opportunity of making further microscopical examination into the condition of the undeveloped wings of one of the large Saturniidæ.

During the winter of 1893 and 1894, I secured a large number of the cocoons of *Attacus promethea* and *Telea polyphemus*. In the early spring of 1894 I watched them closely, so as to secure, if possible, some of the moths on their escape from the cocoon, before expansion had commenced.

I was fortunate on being present at the moment of emergence of a fine large specimen of *T. polyphemus*, which I killed at once before growth had started. After removing the front winglet from its socket in the thorax, I found that the crimpling of the heavy nervures on the costal margin had relaxed, yet, even with that addition to its size, it measured only five-eighths of an inch in length and about three-eighths at its widest part; which might have expanded to three and a half inches in length, and one and a half at its widest part.

I did not discover anything new about the structure of the nervures, but I paid especial attention to them in relation to some suggestions that were made in connection with my former observations, to see how far they might be correct or otherwise.

One was, that the nervures might be constructed spirally, and that the extension of the membrane of the wing might be produced by, as it were, the relaxing of a compressed spring. I could see nothing to confirm such a view. The prominent rings of each segment made a complete circle. The extension of the nervure is in a straight line, something after the manner of the drawing out of a telescope, only, the one section not merely draws out of the other, but the small end of the one section draws out with it the inside of the large end, and keeps on extending until the nervure is all brought to a uniform thickness, with a slight reduction to the outer end.

It has been claimed by some, that the fluid enters the nervures and assists in the extension of the membrane. This, I am satisfied, is not the case. I examined the large nervures of an expanded wing, and found some parts of them hollow, and quite empty, which would not have been so if fluid had entered them. Moreover, the parts of the nervures where the segments unite seem to be solid, somewhat resembling the joints of a bamboo-cane, which would make the passing of the fluid through them almost, if not quite, impossible. My impression is, that the nervures do not in any measure contribute toward the extension of the wing, but depend for their own extension upon the pressure derived from the fluid flowing between the membranes.

The amount of fluid stored up in a newly emerged imago to be used in expanding the wing, must be very great. One of my *A. cecropia* in coming out of the cocoon, had in some way got a piece torn off a front winglet. Whilst expanding, fluid began to show at the break, and by the time the wing was fully extended, large drops hung all along the broken edge. This wing expanded as perfectly as the unbroken one; showing that there was enough fluid to do the work and some to spare.

I thought by maceration and manipulation to draw out the winglet to some extent; but was disappointed and not a little surprised to find that I could make little or no impression upon it in that direction. I afterwards thought that I discovered the reason of my failure.

I succeeded in cutting out a longitudinal section from between the heavy costal nervures of the winglet. Placing it on one of its cut edges under the microscope, I found that I had got a beautiful and intensely interesting object of contemplation. The gatherings of the membrane on the upper surface of the winglet, lay before me in a uniformly symmetrical row of elongated loops, with a row of tiny scales on the crest of each. The loops were nearly closed at their base, widest a little above their centre, making a narrow curve at their apex, open and quite empty. I looked for, and expected to find in the

membrane of the underside, loops or gatherings, corresponding in some measure to those of the upper side, but could see none or anything resembling them. The membrane appeared only roughened and wrinkled. It was extremely thin and very frail, and the base of the loops seemed to be attached to its inner surface. The thought occurred to me that this would account for my inability to draw out the membrane of the winglet, and will in a measure explain the reason for the comparative slowness of their expansion as compared with butterflies. That is, supposing the wings of butterflies are constructed upon a different principle; but this is a point which will require much more careful investigation than I have given to it.

The extent to which the fluid of the insect gives color to the scales is a very interesting subject for consideration. The fluid differs in color in different species. The color of the fluid decides the color of the membrane in the expanded wing; but to what extent it affects the color of the scales is not so easily determined.

Prof. V. L. Kellogg, in his able and interesting paper, "The Taxonomic Value of the Scales of the Lepidoptera," which appeared in the Kansas University Quarterly, for July, 1894, on page 49 says: "The scales are attached to the wings by means of their short pedicels fitting into minute pouches or cups on the surface of the wing membrane. . . . The cups sink but slightly into the wing-membrane, the outer open end being at the surface of the membrane, and the inner closed end or bottom of the pocket, being only slightly below the surface. . . . Thus the cups are more truly little pockets on the surface of the wing, than pits or cavities in it." On page 50 he says: "The pedicels of the scales are of slightly varying shapes and of different lengths, corresponding with the pockets into which they fit. Those which enter insertion-cups which are expanded at the base, or at some point between the base and the mouth, present at the tip or between the tip and the point of merging into the blade of the scale, respectively, a slight expansion, so that they are pretty firmly held in the cup by a sort of ball and socket attachment."

These quotations convey no intimation that there is any opening at the top of the scale, or that the tip passes through the inner surface of the membrane, whereby the fluid could enter the scales whilst flowing between the upper and under membranes of the wings. And yet I think we have positive proof that in some instances the fluid does enter the scales and influences to some extent their color.

When commencing his description of the structure of scales, the Professor, on page 51, says: "The scales are flattened sacs, composed of two membranes, enclosing sometimes only air, sometimes pigment granules attached to the inner face of one of the membranes, and sometimes (as observed in cabinet specimens) the dry remains of what may have been during life an internal pulp." Here in a foot note, Prof. Kellogg refers to Minot and Burgess, who, in their description of the anatomy of *Aletia*, declare that in all of the scales examined by them there was always an internal pulp which contained coloring matter. Then on page 69 Prof. Kellogg states that: "The colors of scales are produced by two causes: (1) The presence of pigment; (2) The overlapping, lamination and striation of the scales which produce those familiar but striking optical phenomena due to the interference of the waves of light. Combinations of these causes are usually present, so that the resulting color effects are practically incapable of analysis."

But there is a third cause of coloring. The long, slender scales on the winglets of a newly emerged *luna* are as pure a white as those upon the abdomen; when the wings are expanded these same scales are tinged with yellow. Whence did they obtain it? It is a well-known fact in the coloring of materials that a small quantity of green entering a pure white, a yellow is the natural result. Therefore the conclusion to me is irresistible, that a portion of the green fluid passing between the membranes of the expanding wings entered the scales—not enough to make them green, but sufficient to make them yellow. And there may be other lepidopterus insects which have the color of their scales modified in a similar way, but which will have to be detected by observing and comparing them in their unexpanded state with those on the expanded wing. The scales on an undeveloped wing are as much compressed, in proportion to their size, as the wing itself. As it

requires the action of the fluid to expand the wing, the natural inference is, that similar causes are required to produce similar results in the scale ; but whether there is an opening in the scale corresponding to that at the base of the wing, to admit the fluid, or whether it enters by cell absorption, has yet to be demonstrated. In the great majority of cases the scales have their colors decided in the chrysalis, by internal pigments probably. What change takes place, if any, during expansion, I have not been able to ascertain, except a perceptible brightening of the colors.

After my paper was written I received from Mr. Balkwill a chrysalid of *D. archippus*, which had matured up to the point of emerging, then died before accomplishing it. I removed a winglet and proceeded to investigate. I failed to extend this winglet as completely as I did that of *Polyphemus*. It was much more elastic, and I could draw it out about half its own length, but it would go back again, and it was easier drawn out laterally than longitudinally. I found it impossible to remove the scales by any means at my disposal, and was becoming hopeless of seeing the structure of the membrane. I removed the costal nervure, and when examining the cut edge with a lens I perceived in one place that the edges of the membranes had parted. By many efforts and steady directing I succeeded in getting the point of a pin between them, when I found that the winglet was like an empty sac. The two membranes were not in the least attached ; even at the edges there was no pressure required to separate them, and the only thing that showed any symptom of holding them together was the fringes ; so I separated the two membranes clean from base to apex without an effort, when the whole structure of the winglet was exposed to view. The nervures are in the upper membrane, with a groove in the lower, opposite, into which they fit. Both membranes are structurally alike, but the gatherings are perceptibly finer in the lower as compared with the upper. The surface, under the microscope, presented the appearance of a multitude of light grey transverse lines with dark spaces between. The gray lines are the under edge of the gatherings, whilst the dark spaces are the openings into the loops, on the crest of which the scales are situated. The transverse lines are not solid lines, but seemed to be made up of minute elongated dots. Near the base of the winglet some of the lines had the appearance of being composed of wide-spread W's. Elsewhere the lines of the W's were erect and closely packed. This gives quite a different view of the wing structure from that obtained in my former observations of the upper surface of the membrane. Here we see all the material that is required for producing a wing two inches in length by one inch at its widest part, compressed into a space less than three-fourths of an inch long and three-eighths wide. We also see that there is nothing to prevent its rapid, or even instantaneous expansion when the fluid from the living insect enters between the membranes in sufficient quantity and force ; but that is required for the purpose, and nothing else seems capable of producing the wing extension ; but why the fluid does not escape at the edges I do not know, and yet all the butterflies that I have observed burst their chrysalis always let fall some drops of fluid, and it may be that this is whence they come, and which would also account for the general external moistness of the imago at that time.

But to return to a consideration of the moths. I am now convinced that there must be an actual growth of the lower membrane during the progress of their wing expansion. There is nothing in its structure resembling the gatherings observed in the lower membrane of this butterfly. There is an appearance of looseness in its texture, but it has none of the elasticity of the other ; it would tear rather than yield. Then again, when small moths are expanding their wings, the edges invariably curl under, as if the upper surface was extending more rapidly than the lower, which no doubt is the case, and is the cause of the curling, and as they press the two upper surfaces together it assists in extending the lower membrane and straightens out the curls. Here the question arises, are the wings of all moths constructed on the same principle ? And are those of butterflies all constructed upon the other ? The further one travels along such a road the greater appears the distance to the end.

BORDEAUX MIXTURE AS A DETERRENT AGAINST FLEA BEETLES.

BY L. R. JONES, BURLINGTON, VT.

Bordeaux mixture is a remarkable compound. After many comparative tests, experimenters have decided that no other mixture or solution yet discovered is equal to it as a general fungicide. Furthermore, those who have studied its action upon plants are agreed that it exerts upon them some beneficial influence entirely apart from its fungicidal effects.*

So far as I know, however, Bordeaux mixture has never before been experimentally shown to have value as a remedy against insects. Some experiments in this line made at the Vermont Experiment Station during 1893 and 1894 will therefore have so general an interest that I present the results before this Society.

Potato plants in Vermont suffer from the attacks of the cucumber flea beetle (*Crepidodera Cucumeris*, Harris). I cannot estimate the amount of the damage to the entire potato crop of the State from these insects, but I am convinced that it is most serious, especially during a dry summer, such as we have just experienced. In confirmation, I will pass around for your inspection, some leaves taken from our experimental potato plot at Burlington. You will perceive that many of them are completely riddled with the small holes eaten by these flea beetles. These leaves do not exaggerate the condition of the entire plants in many portions of our field. Leaves punctured and even skeletonized, as some of these are, suffer much from the loss of so considerable a portion of their leaf tissue. Moreover, leaves thus mutilated are most disastrously exposed to the effects of drouth during dry weather, and to the inroads of fungi and other parasites during wet weather. Indeed, these secondary injuries follow so closely after the attacks of the flea beetle, and the beetles themselves are so small and shy, that the great majority of potato growers attribute the entire trouble to these secondary agencies.

Entomologists have tried many remedies against these flea beetles. The one commonly recommended by them for use on potatoes is the standard insecticide, Paris green, mixed with land plaster and dusted upon the plants. As will be seen from our results below this poison has been of comparatively slight value with us. Certain fungicidal compounds, however, proved of decided worth in our experiments of 1893. These fungicides were originally applied to check the fungous diseases to which potatoes in Vermont are especially liable. Noticing that these sprayed rows were less badly eaten by the flea beetles, a careful count was made of the number of holes in fifty leaflets from each row of one plot under treatment. The results were as follows: †

In 50 leaflets sprayed with . . .	very weak Bordeaux mixture,	1,794 holes
“ “ “ “	. . . ammoniacal copper carbonate,	1,587 “
“ “ “ “	. . . modified eau celeste,	1,376 “
“ “ “ “	. . . weak Bordeaux mixture,	1,295 “
“ “ “ “	. . . strong Bordeaux mixture,	1,194 “
“ “ “ “	. . . strong Bordeaux mixture and soap,	945 “

These plants had been sprayed but once, August 1st. The examination was made August 12th. From our observations during the present summer (1894), we are convinced that most of the holes in the leaves sprayed with Bordeaux mixture had been made before the plants were sprayed at all, *i.e.*, before August 1st. The present season observations upon these insects were begun earlier. The beetles were first seen about June 1st. By June 12th some of our early potatoes were badly eaten. This attack lasted but a short time, however, and during the latter part of June and first two weeks of July but few beetles were seen. Suddenly, about July 20th, they again appeared in large numbers, and during the next ten days did great damage to unprotected potato plants. Previous to this time portions of our plants had been sprayed with various fungicides, and all the plants sprayed with the stronger copper compounds, especially with the Bordeaux mixture, have remained practically free from the flea beetle injuries up to date.

*U. S. Dept. Agric., Div. Veg. Path., Bul. 7, p. 31.

It has been unusually dry with us, and in consequence our field is free from fungus troubles, yet the contrast between the sprayed and unsprayed rows is most striking. On the unsprayed rows every leaflet has from 50 to 500 flea beetle punctures, the plants are pale and sickly, and are already beginning to shrivel from the drought. The rows sprayed with Bordeaux mixture are practically free from the flea beetle mutilations, vigorous and thrifty. I have brought for your examination two entire potato plants taken from adjoining rows, the one sprayed with Bordeaux mixture, the other not, which fairly represents these differences. A few days ago two leaves were taken from each hill of these two rows and carefully examined. An average of twelve flea beetle punctures per leaflet was found on the row sprayed with Bordeaux mixture. On the adjoining row which had received no Bordeaux mixture, but had been freely dusted with Paris green (1 pound Paris green in 50 pounds land plaster) there was an average of 262 holes per leaflet.

We therefore feel justified in advising the use of Bordeaux mixture on potatoes for a new purpose, namely: As a deterrent against flea beetles. The use of Bordeaux mixture as a fungicide has proved especially profitable with us during wet seasons. This newly discovered virtue will warrant its use during the dryest seasons also, since the flea beetles are most troublesome then. Judging from our experience this season, in Vermont two applications of the mixture will suffice to hold these beetles in check, and upon late potatoes one application will probably prove sufficient. The first application should be made upon early potatoes during the first week of June, and another about July 15th. This latter application is also well timed for the prevention of the fungus diseases of the potato. Upon later potatoes the earlier application just mentioned is not necessary. We may, therefore, say that practical immunity from flea beetle injuries to potatoes may be secured at the cost of but a single application of Bordeaux mixture in addition to those already recommended for the fungus diseases.

Regarding the value of other fungicides tested, modified Eau Celeste has proved nearly as effective a deterrent against these beetles as has Bordeaux mixture. All of the other copper solutions tested have had similar deterrent effects roughly in proportion to the amounts of copper contained. The inference, therefore, is that the copper salt is the element especially distasteful to the beetles. Soap, when mixed with these fungicides adds slightly to their value as deterrents, but not enough to justify its addition for general use.

THE GYPSY MOTH (*Ocneria dispar*, L.).

BY JAMES FLETCHER, OTTAWA.

Of the many injurious insects introduced at various times from the old world, not one has, in as short a time, attracted so much attention, been so great a cause of anxiety, or been so systematically fought as the Gypsy moth, since it appeared in vast numbers in the State of Massachusetts in 1889. As a practical object lesson of the value of scientifically directed effort to overcome an insect enemy which had been allowed to increase unnoticed until it had assumed almost overwhelming proportions, the campaign which has been so successfully carried on for the last four years by the Gypsy Moth Department of the State Board of Agriculture of Massachusetts is of very great interest to all economic entomologists.

Having recently passed through part of the infested region, my attention was attracted to the trees bearing bands of burlap or marked with the various signs used by the inspectors to denote that they had examined the trees. Since my return to Canada, I have been favoured with a full series of the excellent reports of the Commission, together with much other information as to the methods of work, which have been kindly furnished by Prof. E. H. Forbush, the director of field work. On the whole, I think all must acknowledge that, up to the present time, the efforts of the Commission have been very successful; but whether the enemy is entirely exterminated must depend upon whether the work is continued in the same careful manner for at least a few years longer.

Mr. L. O. Howard, the United States Entomologist, one of the best qualified to express an opinion, says, in his recent address as President of the Association of Economic Entomologists, as follows: "The work upon the Gypsy moth which has been done by the State of Massachusetts since 1889, is one of the most remarkable pieces of work, judging by results, which has yet been done in Economic Entomology. The operations have been carried on by a Committee of the State Board of Agriculture, and the means have been furnished by large appropriations by the State Legislature. Three hundred and twenty-five thousand dollars have already been appropriated. A territory comprising something over 100 square miles was infested by the insects, which occurred in such extraordinary numbers as to destroy many trees, and almost to threaten the ultimate extinction of living vegetation, not only within the infested territory, but in all localities to which it might spread. . . . The infested territory has been reduced by one-half, and within the districts in which the Gypsy moth at present exists, it is, practically speaking, a comparatively rare species. The future of the insect is, however, problematical. The continuance of sufficiently large appropriations from the State Legislature to enable the work to be carried on, on its present scale, is doubtful, and yet those in charge believe that still larger appropriations are necessary to bring about extermination. They are confident, however, that with sufficient means, the insect can be absolutely exterminated from the State of Massachusetts."

It will be instructive to consider how it was that this pest became so numerous before it was noticed, what measures were taken to control it, and lastly, what can be learned from the efforts of the Commission.

Prof. O. H. Fernald, the eminent Entomologist of the State, and Prof. Forbush have given, in the reports, most careful accounts of the introduction, habits and best methods of fighting this pest. There seems to be little doubt that the species was introduced into America in 1868, by a Mr. L. Trouvelot, then living near Glenwood, Medford, Mass., where he was carrying on experiments with various caterpillars as producers of silk. Having brought from Europe a cluster of the eggs of the Gypsy moth, he took them out of the box and laid them on the sill of an open window, whence they were blown away and lost. From this centre the moth scattered in every direction until, in 1891, it was found to have spread, during the twenty-three years, over thirty townships.

The chief causes of its increase are the prolificness of the females, the hardiness of the species, and the fact that it feeds upon almost every plant wild or cultivated; the caterpillars also seem much less susceptible to injury from the ordinary poisonous insecticides than most of our native caterpillars and being an introduced insect, of which all the members of the present devastating hordes were derived from one nest of healthy eggs, the species is not attended by the natural parasites which in Europe keep, as a rule, its numbers within reasonable bounds.

It seems strange that so voracious a creature as the Gypsy moth caterpillar could have increased so largely as is described in several letters from correspondents which are published in the 1894 report, without having attracted sufficient notice for some one to have sent specimens to the official Entomologist of the State sooner than 1889. Mrs. Belcher, of Medford, Mass., writes: "Mr. Trouvelot, who is said to have introduced the Gypsy moth into this country, was a next door neighbour of ours. The caterpillars troubled us for six or eight years before they attained to their greatest destructiveness. This was in 1889. They were all over the outside of the house, as well as the trees. All the foliage was eaten off our trees, the apples being attacked first, and the pears next. They ate nearly every green thing in my yard, killing my rose bushes and doing much damage to the vegetables. No one who did not see them at that time, can form any idea of what a pest they were. We killed many with boiling hot water, and would then dig a hole and bury them so as to prevent a stench. Mr. Belcher was poisoned by them. While he was killing them upon the trees, they would get upon his neck and poison it. It was impossible to stay long in the garden, for they would crawl all over one. We fought them for two or three years before the Commission took hold. When they hatched out in the spring, our fence would be one living mass, and while they were small it was almost impossible to keep them off one's person."

Mr. J. P. Dill, of Medford, also gives a graphic account descriptive of the great numbers and annoyance due to this scourge: "The caterpillars first appeared in May and were at their worst in July. They ate all the leaves off the trees until it seemed as though fire had run through them, trees finally becoming as leafless as in midwinter. After eating the apple tree leaves, they completely stripped a Bartlett pear tree. We got no fruit from either the pear tree or the apple trees that year. That summer we could have got the caterpillars out of the holes in the trees by pecks. After the caterpillars had eaten all the leaves off the trees, they went down into the grass where they swarmed. When the plague was at its worst, that summer, I do not exaggerate when I say that there was not a place on the outside of the house, where you could put your hand without touching caterpillars. At the time the caterpillars were the thickest on the trees, we could plainly hear the noise of their nibbling at night. It sounded like the pattering of very fine rain drops. If we walked under the trees, we got nothing less than a shower bath of caterpillars, which spun down from the trees by hundreds, even when they were of large size."

There are several letters in the same tenor, bearing evidence to the enormous numbers of this pest at the time when the assistance of the State Entomologist was sought in 1889. We find that immediately following this, vigorous steps were taken to make known the gravity of the occurrence, and the Legislature was induced to make appropriations and appoint the Commission, which, by its energetic and successful efforts, has attracted the attention and admiration of the whole world.

Undoubtedly, one of the reasons that this insect made such headway without being noticed generally, was the culpable and unpardonable ignorance which prevails everywhere and in all countries, even among sensible people, concerning the habits of the injurious insects which yearly destroy such vast quantities of produce of all kinds. This ignorance on the part of the public is unpardonable, because it is in a large measure unnecessary; not only have efficient remedies been found out by officers paid by themselves through the State treasury, but the results of the work of these officials are in most cases at the disposal of anyone who will ask for them. Another reason that the pest did not sooner

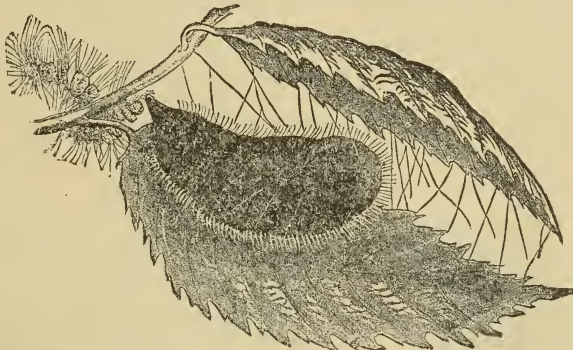


Fig. 44.—Gypsy moth, chrysalis.

attract attention, was probably that the caterpillars feed normally at night, and during the day hide in cracks and crevices of the bark, or rest on the trunks of trees, where by reason of their colouring they are not easily detected. It is only when their numbers become excessive and the food supply is diminished, that they feed at all times of the day and night, and wander from place to place. A feature of the work of the Commission has been the making known, as widely as possible, the appearance of this insect in all its stages. Not only were beautifully coloured plates published in all the reports, but show-cases were made up and distributed to schools and public institutions, illustrating by actual specimens the appearance of the eggs, caterpillars, chrysalis, and perfect moths.

The eggs are laid from July to September in oval or rounded clusters, containing from four to five hundred eggs, covered with the yellowish hair from the body of the female. These clusters of eggs are placed indiscriminately on any object near to where

the female emerges from the chrysalis (Fig. 44), on trees, fences, stone walls, etc. They are mostly laid about the middle of July, and do not hatch until the following spring. Both the egg-laying and the hatching of the young caterpillars are very irregular, so that the insect may be found active throughout the season. The caterpillars (Fig. 45), although extremely voracious, take a long time to complete their growth. When full-grown, they are nearly two inches in length, and although gaudily marked when examined closely, they are nevertheless inconspicuous when at rest on trees. "The general colour of the body is creamy white, thickly sprinkled with black. The ground colour shows in the dorsal and lateral lines which are somewhat broken. The tubercles on each side of the dorsal line from the second to the sixth inclusive are blue and give rise to short black

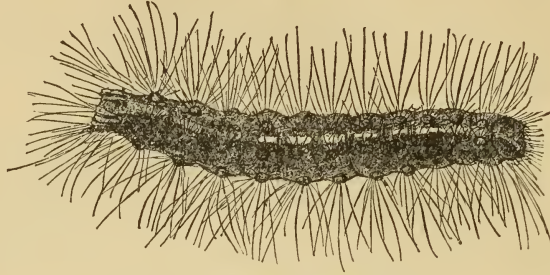


Fig. 45.—Gypsy moth, caterpillar.

spines. On each side of the remaining segments, except the last, the tubercles are dark crimson. On the top of the tenth and eleventh segments, on the dorsal line is a small cylindrical fleshy tubercle without hair or spines, the top of which is slightly inverted. It is uncertain what is the function of these organs, but it is quite possible they are scent organs."

"On the posterior edge of the last segment are four bluish-white tubercles giving rise to black spine-like hairs. The spiracles are oval, pale yellow, and encircled with black. The legs are dark crimson and the pro-legs flesh-coloured and streaked with reddish-brown."—(Fernald.)

There are other but less conspicuous markings, which it is not necessary to mention here. When full-grown, the caterpillars spin a small quantity of silk and change to the chrysalis condition. This usually occurs in July or August, and in Massachusetts the insect remains in this state from eight to twelve days.



Fig. 46.—Gypsy moth, male.



Fig. 47.—Gypsy moth, female.

The male (Fig. 46) and female (Fig. 47) moths are very dissimilar in appearance. The former measure from one and a half to two inches across the expanded wings. The ground colour of all the wings is brownish-yellow, varying in intensity in different examples. The head, thorax and antennae are grayish-brown. The wings are crossed by about four wavy black lines which are darkest on the costal edge of the wings. The terminal space is also darker than the rest of the wing, and the fringe is cut with dark brown between the veins. The males fly easily, in which they differ from the females, which can only fly down from an elevation.

The females are larger, varying from one and a half to two and a half inches between the tips of the wings; the entire body is white, except the abdomen beneath and the tip above, which are yellow. The markings on the fore wings are dark brown, or nearly black, but in some specimens are almost obliterated. The figures shown herewith have been kindly lent by Prof. Forbush, and give the general appearance of the markings of the two sexes, the chrysalis and the caterpillar.

The methods which have been adopted in the prosecution of such extensive operations as have been necessary, have been changed from time to time according to circumstances and experience, and many valuable data have been recorded which will be of great assistance for reference in future work. For carrying on this warfare, it was necessary to train all the inspectors and the many men required to cover the ground, and to attend to the many details connected with the destruction of the insect in its various stages, and the prevention of its spread into other districts. This involved an immense amount of careful work, which naturally took much time and money. A small hand-book, entitled "Laws, Rules and Regulations relating to the extermination of the Gypsy Moth," was printed for the use of the employees, giving a copy of the Act of 1891, authorizing the work, "Rules and Regulations for the Public," most complete "Rules and Regulations for the Agents" employed, and finally a very complete but concise account of the life history and habits of the Gypsy moth.

The methods employed were briefly as follows: The destruction of the egg was effected by saturating the clusters with creosote oil, dilute nitric and carbolic acids. For the caterpillars, trees were banded with burlap, which provided a hiding place in which they were afterwards destroyed; or a material called "raupenleim" or "insect lime," was placed upon the bands to prevent the caterpillars from climbing trees. Underbrush was cleared out wherever possible, and useless and hollow trees which would form hiding places, were cut down and burnt. Traps were also devised in which females were enclosed for the attraction of the males, which were successful. Wherever possible, shade trees, orchards and woodlands were sprayed with poisonous mixtures. As it was known that the moths were disseminated mainly by vehicles driving beneath trees in infested centres, efforts were made to inspect all vehicles going out of such districts and to clear thoroughly all trees along the roads. Great care seems to have been taken to obtain an accurate knowledge of the extent of the infested territory. Prof. Forbush, in his 1894 report, says: "The means, which though expensive, have given the best results and have finally exterminated the moth from localities and towns, consist of a thorough long-continued and repeated search by competent men, not only of all known infested localities, but of entire towns. The moth is now so rare in most of the infested towns that it is only by such search that it can be found, and this search must be relied upon to assure extermination. When a colony is found, all forms of the moth must be destroyed; loose bark must be scraped from the trees, the undergrowth cut and burnt, all cavities which may serve for hiding places filled, and the locality carefully watched for at least two years."

Among the good results of this investigation is the discovery of the value of Arsenate of Lead as an insecticide. The experiments with insecticides made under Prof. Fernald's direction, prove that the arsenites as commonly used for spraying foliage are comparatively ineffectual against the Gypsy moth. It was found that the caterpillars will feed for days without apparent injury, upon trees which have been sprayed with Paris green or London purple, in a mixture so strong as to somewhat burn the leaves. In fact, the committee, in the spraying they are carrying on at present, have found it necessary to use arsenate of lead in as strong proportion as 10 pounds to 150 gallons of water. The great value of arsenate of lead is that it can be used freely upon foliage without danger of injury to the plant, as is the case with the generally used arsenites, Paris green and London purple. The greatest success in clearing the infested districts seems to have been secured by destroying the eggs late in the summer and in early fall, as soon as possible after they are deposited. If they are not disposed of at this time, some of the egg-clusters may be broken, and the eggs scattered by man, animals, or the elements. The treatment with acids is preferable to collecting, as there is less danger of breaking up the clusters and dropping

the eggs. For the destruction of the caterpillars, Prof. Forbush reports that "the method of banding the trees with burlap is the most effective one yet devised to dispose of this form of the moth. The burlap offers them a convenient shelter, and if it is put on all infested trees, and frequently examined, many caterpillars will be caught that would otherwise escape notice. One hundred and fifty thousand yards of this material were purchased. It was cut into strips and applied to the trees in infested localities. It is necessary to examine the burlap bands once each day, or at least once in two days, to be sure of securing all the caterpillars which gather beneath them."

In view of the great difficulties which the commission had to face in solving the problem of the extermination of the Gypsy moth, the immensity of the work, the impossibility of forming a true estimate of the extent of the infested country or of the money required and, as it turned out, of the habits of the insects and the best remedies, too great credit cannot, I think, be given to those who have so wisely and ably directed the efforts to stamp out this dire enemy.

It will, indeed, be short-sighted policy, if the Legislature of Massachusetts does not now provide the funds necessary to finish up this good work. For nothing is more certain than that, if the amount estimated by the director with all the experience of the past three years, as absolutely necessary, be not forthcoming, not only will all the good work already accomplished be nullified, but at some time in the future it, and much more, will have to be done over again at a far greater expense. In concluding his last report, Prof. Forbush says: "The statute under which the committee is appointed, calls for extermination. The cost of extermination is great. It certainly costs more to search for the last egg-cluster, caterpillar or moth, than it would to destroy the majority of them and thus prevent both dissemination and damage for the time being. But if larger sums of money than those already appropriated can be secured and the extermination of the moth can be accomplished, an expense will be stopped, which must otherwise be continually increasing and which must be borne annually for an indefinite period, either by the State or by all residents of the country over which the moth would extend its constantly widening range. Encouraging progress towards extermination has already been made with manifestly insufficient funds and in the face of many obstacles. The numbers of the moth have been so reduced that no material damage has been done by it during the past two years. It has been exterminated first from single trees, then from orchards, woodlands and entire towns. More than 800 infested localities have been entirely freed of its presence. This work was begun on the borders of the infested region, and has progressed toward the centre until the moth appears now to have been exterminated from more than one-third of the region infested in 1891."

This was written in February, 1894. In Prof. Fernald's report, published in the same volume, are statements from six of our most prominent official entomologists, all of whom testify to the admirable way in which the work has been carried out. Prof. Packard says: "It seems to me that the work is practical and thorough throughout." Prof. Weed, of New Hampshire, says: "I have never seen a series of similar experiments carried on in so large a scale or in so thoroughly scientific a manner." Dr. Fernald, of Pennsylvania, says: "A careful consideration of the methods used and of the results already obtained, has convinced me that the extermination of the Gypsy Moth is not only possible but certain, if the work be prosecuted for a sufficient length of time." Prof. John B. Smith says: "The force has accomplished wonders, and I feel that there is very good reason for the belief that the Gypsy moth can be exterminated, provided the means are furnished." Dr. Lintner, of New York, says: "How a work of such magnitude, extending over so large a territory, could have been accomplished was a wonder and an enigma to me, until I became acquainted with the means by which it had been brought about."

THE SAN JOSÉ SCALE. (*Aspidiotus perniciosus*, Comstock).

BY JAMES FLETCHER, OTTAWA.

The unexpected discovery, in the Eastern United States and British Columbia, of this scourge of the Pacific Coast orchards, makes it all-important to draw the attention of Ontario fruit-growers to the subject, so that they may become familiar with its appearance and be prepared to adopt active measures to eradicate it, should it, as it is more than probable, appear in our province.

In August, 1893, the first eastern specimens of the San José scale were brought to the notice of the United States Entomologist, and he at once took active measures to find out all that was to be learned concerning its distribution and injuries, with the object of stamping out such a formidable enemy. In April, 1894, Mr. Howard issued a circular under the caption, "An Important Enemy to Fruit Trees," in which he gave a short history of the insect and the most approved remedies. He has been kind enough to lend Fig. 48 from that bulletin, which will be of great service in giving an idea of the appearance of the insect.

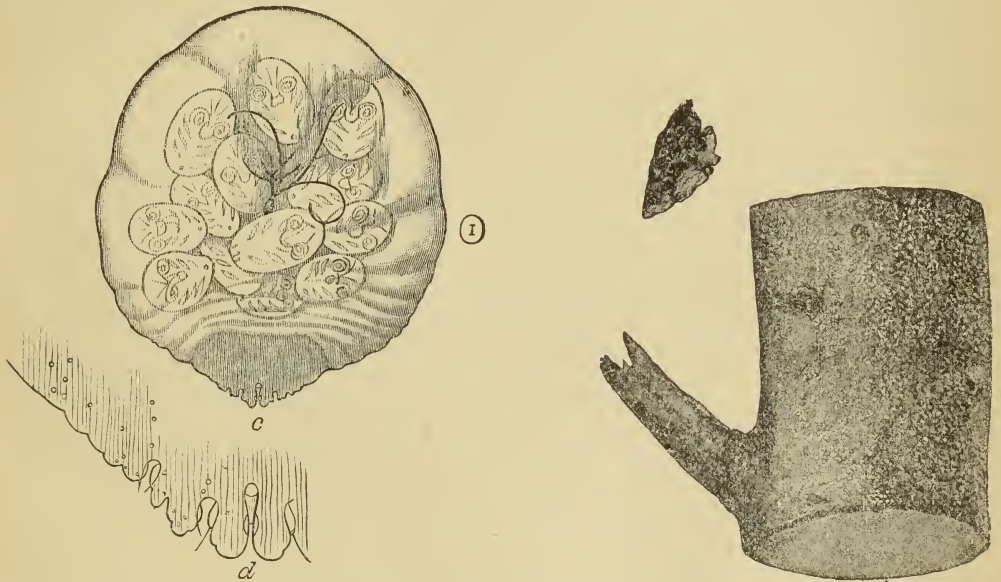


Fig. 48.—San Jose Scale, female enlarged and part of infested branch (life size).

The San José Scale was first brought to California it is thought, from Chile about 1870, and it was first noticed as injuriously abundant at San Jose in 1873, and called the San Jose Scale. "It does not seem to have been named scientifically until 1880, when Prof. Comstock described it in his annual report to the United States Department of Agriculture—he designated it *perniciosus*, because he considered it the most pernicious scale insect known in the country. It swarmed in countless numbers upon the trees in certain orchards, and infested all the deciduous fruits grown in California, except the apricot and Black Tartarian cherry. In the course of twelve years, the insect spread through all the fruit-growing regions of California, through Oregon, and into the State of Washington. It is known as the worst insect pest of deciduous fruit trees on the Pacific coast, and has caused great pecuniary loss. Many crops of fruit have been ruined, and thousands of trees have been killed." (L. O. Howard, Circular 3.)

In 1892 the insect was found in New Mexico on apple, pear, plum, peach, quince and rose. It had been brought into New Mexico upon young trees from California. Nearly all the other instances of infestation east of the Rocky Mountains can be traced to two nurseries in New Jersey, where the pest had been introduced in 1886 or 1887 on

trees of the Japanese plum "Kelsey," which had been procured from the San Jose district in California. Idaho pear trees had also been frequently imported from California which were most probably infested. In 1891 and 1892 several blocks of young apple trees were badly infested. It is on pear trees chiefly that this pernicious scale has been distributed through the state of New Jersey. Prof. J. B. Smith says (*Insect Life*, VII., p. 166): "The Idaho pear has been the most dangerous because it came infested whenever imported direct, and after it came in close order, Madame von Siebold, Garber, Lawson, Seckel, Lawrence and Bartlett. Other varieties are also infested, but less frequently, and the scales do not do so well. Kieffers alone are absolutely exempt, and closely following comes the Leconte, which is rarely infested in the nursery, and never in the orchard, in my experience. One tree grafted with Lawson and Kieffer had the Lawson branch and fruit covered with scales, while the Kieffer branch was entirely free. Currants, black and red, became rapidly infested, and the scales were certainly distributed on these plants."

Mr. Howard says that this insect spreads rapidly for a scale insect, and is the most dangerous scale known. It is, too, inconspicuous and would be overlooked by many. Specimens of infested apple boughs received from British Columbia were entirely incrustated with the scales so as to give them the appearance of having been dusted with ashes. Mr. Howard gives the following description of the scale in his circular above referred to: "The San Jose Scale belongs to the same group of scale insects—the Diaspinæ, or armoured scales—to which the Oyster-shell Bark-louse of the apple belongs. It differs from this species, and in fact from all other eastern species found upon deciduous fruit trees, in that the scale is perfectly round, or at most very slightly elongated or irregular. It is flat, pressed close to the bark, resembles the bark of the twigs in colour, and when fully grown is about one-eighth of an inch in diameter. At or near the middle of each scale is a small, round, slightly-elongated, black point; or this point may sometimes appear yellowish. When occurring upon the bark of the twigs or leaves, and in large numbers, the scales lie close to each other, frequently overlapping, and are at such times difficult to distinguish without a magnifying glass. The general appearance which they present is of a grayish, very slightly roughened scurfy deposit.

The natural rich reddish colour of the limbs of the peach and apple is quite obscured when these trees are thickly infested, and they have then every appearance of being coated with lime or ashes. When the scales are crushed by scraping, a yellowish oily liquid will appear, resulting from the crushing of the soft yellow insects beneath the scales, and this will at once indicate to one who is not familiar with their appearance the existence of healthy living scales on the trees. During winter the insect is to be found in the half-grown or nearly full-grown condition. The young begin to hatch and to crawl from under the female scales shortly after the trees leaf out, and from this time through the summer there is a constant succession of generations. The insect affects not only the young twigs and limbs, and with young trees, the entire plant, but is also found upon the leaves and upon the fruit. When abundant, the fruit is destroyed. One of the most characteristic points in the appearance of the insect upon fruit, is the purple discoloration around the edge of each scale.

The above description will enable fruit-growers to recognize this enemy, should they be unfortunate enough to get their orchards infested with it.

REMEDIES.

With regard to remedies, we have the advantage of all the experience of Californian experimenters and the careful work of the Division of Entomology at Washington, as well as of Prof. J. B. Smith of New Jersey during the past year. There are three methods which have proved effective in fighting the San Jose Scale. In cases of severe attack it is recommended to cut down the infested trees and burn them. The other methods are, spraying with insecticidal washes, or fumigating the trees with poisonous gases. The insecticidal washes may be divided into summer washes, which can be applied while the trees are in leaf, and winter washes of a

stronger nature, which would injure the foliage but will do no harm to the trees during the winter, when they are in a dormant condition, and yet will have the effect of destroying the scale insect. Of the *summer washes*, the ordinary kerosene emulsion (Riley-Hubbard formula) and a resin wash [resin 20 lbs., caustic soda (70 per cent. strength) 5 lbs., fish oil 3 pints, water 100 gallons] were recommended by Mr. Howard, and used with success during the past summer. On peach trees, owing to the susceptibility of the foliage to injury, the stock kerosene emulsion was diluted with fifteen times its volume of water, instead of nine times, the usual strength advised for most other plants. It was found advisable to repeat the sprayings at intervals of about a week. The young scale insects were noticed on May 19th at Riverside, Md., and the females, viviparous in habit, gave birth to young for a full month. This was upon peach trees, and it was found that the resin wash killed the scales more quickly than the very diluted kerosene emulsion, and, as Mr. Howard points out, this rapidity of the work is important, since where a full-grown female is sprayed with kerosene emulsion, she may live for three or four days, during which time she brings forth young; whereas if sprayed with the resin wash, fewer young scales are produced. The resin wash, however, is readily carried off by the rains, while the kerosene is more resistant.

In Professor J. B. Smith's investigations in Pennsylvania, it is recorded (Insect Life, VII, p. 159) that, "he has visited the locality at Atglen, Pa., and found that in an orchard of over 7,000 trees, all of certain varieties, and a few of others, were infested by the scale. As a result of his recommendations, kerosene emulsion has been applied three times to most of the trees at intervals of ten days, up to the first week in June. The treatment has been absolutely successful."

For *winter washes* the kerosene emulsion and resin washes may be made stronger. The stock kerosene emulsion has been used diluted with only four and a half parts of water, and for the resin wash the same ingredients were used in the following proportions: Resin, 30 lbs.; caustic soda, 9 lbs.; fish oil, 4½ pints; water, 100 gallons.

"The most favored winter remedy in California, however, is the lime, salt, and sulphur mixture. This consists of unslaked lime, 10 lbs.; sulphur, 5 lbs.; stock salt, 5 lbs.; water to make 15 gallons. This wash will do great damage to the trees if applied during the growing season, and should be used only in winter. All the sulphur and half the lime are placed in a kettle and 8½ gallons of water added, after which the contents of the kettle are boiled briskly for about an hour. The solution which at first is yellow from the sulphur, will turn very dark brown, assuming more or less of a reddish tint, and will finally change from a thick batter to a thoroughly liquid condition, the product being ordinary sulphide of lime. All the salt is added to the remaining 5 pounds of lime and the latter slaked, after which the slaked lime and salt are added to the sulphide of lime already obtained, the whole being then diluted with water to make 15 gallons. This should be strained before application, as it does not form a perfect liquid solution on account of the considerable quantity of undissolved lime, which will soon sink to the bottom unless the solution is constantly stirred while being sprayed."

The third method of fighting scale insects is known as the Gas Treatment. This has been extensively used in California but is an expensive operation, and the materials necessary are very poisonous and dangerous to have about. It consists, briefly, of covering the tree to be treated with an air-tight tent and then filling the tent with the poisonous fumes of hydrocyanic acid gas, which is generated by placing 1 oz. of cyanide of potassium, 1 fluid oz. of sulphuric acid, and 3 fluid oz. of water in an earthenware vessel beneath the tent. The gas is very light and rises to the top of the tent, and if this be kept on the tree for half an hour, every scale will be destroyed. The quantity of ingredients given above is sufficient for a tent enclosing 150 cubic feet.

What is wanted, however, is to know *the best remedy*, and it is satisfactory to learn that on the whole the standard remedy for scale insects, kerosene emulsion, is the best. In summing up his experience of the year, Mr. Howard says as follows: "Remedial work against this insect is onerous, but our experience has shown that three sprayings at intervals of ten days during the latter part of May and June, will practically destroy

the insect, whether the spraying be conducted with very considerably diluted kerosene emulsion or with a resin wash, while during the winter a single application of either of the three winter washes will greatly reduce the numbers of the insect. Among the winter washes our experience leads us to give the preference to strong kerosene emulsion ; next, to the winter resin wash ; and finally, to the lime, salt, and sulphur mixture.

The kerosene emulsion is now well-known to most Canadian fruit-growers ; but it may be well to give it here.

Kerosene (coal oil)	2 gallons.
Common soap or whale oil soap	$\frac{1}{2}$ pound.
Water	1 gallon.

Cut up the soap and boil in the water till all is dissolved, then add it boiling hot to the coal oil ; churn the whole briskly for five minutes with a syringe or force pump. When the emulsion is perfect, it will adhere without oiliness to the surface of glass, and when cooling forms a jelly-like mass, which can be kept indefinitely if stored in a cool place and covered from dust.

When required for use, for a summer wash dilute one part of the stock made as above with nine or fifteen parts of water. To make the stock dissolve easily, take first three parts of hot water to one of the emulsion, and then, when all is thoroughly mixed, add sufficient cold water to make the nine or fifteen parts required ; for a winter wash mix with four and a half or nine parts of water.

INJURIOUS FRUIT INSECTS OF THE YEAR 1894.

BY J. FLETCHER, OTTAWA.

The season of 1894 has been a busy one for the practical entomologist. Not only have the usual complaints come in of injury by the canker worm, codling moth, curculio, cut worm, etc., but beside these there have been special developments of some well-known species, and some new invaders have appeared within our borders. Of these last the most notable are the Pear-tree Psylla, which occurred in large numbers in an orchard at Freeman, Ont., and the San Jose scale, of which undoubted specimens were sent in from British Columbia. The attention paid generally to the remedies advised by entomologists is decidedly much greater to-day than it has ever been before. This is largely due to the satisfactory results which have been obtained by new methods in treating insect enemies, and also by the even more remarkable successes of botanists in controlling fungous diseases. The combined application of fungicides and insecticides is still being carefully studied and the practice of adding Paris green or some other arsenite to the Bordeaux mixture for the treatment of fruit trees, has now been widely adopted by the best fruit-growers. The late action of the British Columbian Government in condemning and destroying shipments of fruits which on arrival were found to be infested by injurious insects illustrates the vigorous policy which has been adopted by the Provincial Board of Agriculture to protect their important fruit industry. This action will also doubtless have the effect of turning the attention of careless and improvident fruit-growers to the subject, and of inducing them to adopt the simple and cheap remedies which entomologists have been advocating for the last ten years and which must certainly result not only in increased wealth to themselves and the province, but gradually in reducing very materially the amount of injurious insect-presence in the Dominion.

The insect which was the cause of the condemnation of the shipments of apples in British Columbia, was the codling moth (Fig. 49 shews the work of the grub in the fruit) which, remarkable as it may seem, has not as yet been authentically recorded as breeding in British Columbia, although it is perhaps to-day the worst enemy of the apple in Eastern Ontario. If it be true that the codling moth is not already established in British Columbia, the wisdom of the Government of that Province in using every reasonable means of keeping it out, must commend itself to everybody.

Two of the worst enemies of the fruit grower are the codling moth (*Carpocapsa pomonella*) and the plum curculio (*Conotrachelus nenuphar*). [Fig. 50 represents all stages of the insect.] After a great many experiments under varying circumstances, spraying the trees with Paris green (one pound of Paris green, one pound of fresh lime and 200 gallons of water) still remains the best remedy; I believe that whether these insects are known to be present or not, it will well repay fruit growers to spray their orchards at least once every spring as a regular operation. Numerous instances have been reported to me of astonishingly successful results from following this course, and hardly any failures; so I can repeat what I said last year, that "where this work is done carefully and intelligently, it is practically all-sufficient." The occasional cases of failure which are sometimes heard of, and these are very rare, are almost invariably due to careless work. In the January number of the *Canadian Horticulturist*, I published an open letter requesting fruit-growers who had failed to obtain paying results from spraying plum or apple trees, to write to me on the subject. After nearly a whole year, I have not

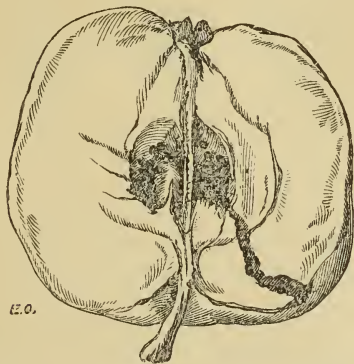


Fig. 49.—Codling moth larva in apple.

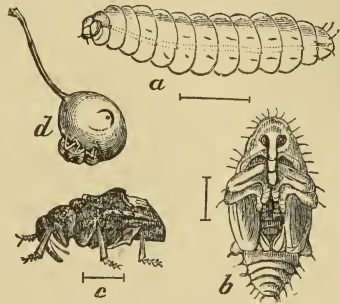


Fig. 50.—Plum curculio.

received a single unsatisfactory reply; furthermore, at the last annual meeting of the Fruit Growers' Association of Ontario, held at Peterboro', the question of spraying apple trees for the codling moth and plum trees for the curculio, came up for discussion. During this meeting which I had the pleasure of attending, I requested those present who had sprayed with Paris green against those insects, to give the results of their experience. Some convincing instances were given by leading members of the Association, which proved the efficacy of the treatment recommended.

SCALE INSECTS.—Considerable injury is undoubtedly due throughout the whole Dominion to the operations of the inconspicuous but very pernicious scale insects; the most redoubtable of these is the Oyster-shell bark-louse (*Mytilaspis pomorum*, Bouche), and it competes every year with the codling moth for the honour of being the worst enemy of the apple tree. The life history, in this species as well as in most others, gives us a suggestion as to the best time to apply a remedy. The scales (Fig. 51) may be found upon the twigs and branches of apple trees, black currant bushes, mountain ash, ash and many other trees during the winter. From these during June emerge minute, white mite-like insects with six legs (Fig. 52), which for a few days crawl about the trees seeking for a suitable spot for them to attach themselves. This is generally on the young wood of the previous year. It is only during these few days that they are able to move, for having chosen a spot they pierce the bark with their needle-like beaks and remain fixed for the rest of their lives. Each gradually secretes a waxy mantle (Fig. 52, 3), and by August has transformed into a scale (Fig. 52, 7), in the case of the females, covering a cluster of eggs. The scales of the males are much smaller than those of the females and of a different shape. The eggs do not hatch until the following June. While the young are in the active state they are very much more susceptible to injury than after the scales are formed. The time of hatching varies somewhat in different localities, but by examining the trees this date can be easily ascertained, and if the trees are then sprayed with a

diluted mixture of kerosene emulsion the insects will be destroyed. A good time also to spray the trees, is early in spring before the buds burst. It is a matter of surprise to some how these insects which pass their lives for the most part attached firmly to the bark can spread so rapidly through an orchard, as they frequently do. This has been explained by the suggestion that at the time the young lice first hatch, they are very active and crawl



Fig. 51.

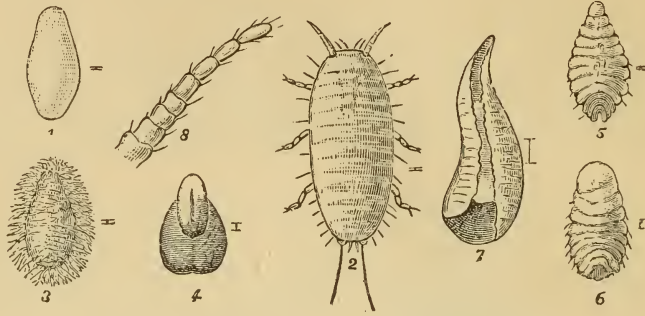


Fig. 52.—Oyster-shell Bark-lice.

with great agility. At this time of the year, the trees are much frequented by birds and other insects, upon which the lice crawl and are then carried from tree to tree by these larger winged creatures.

Belonging to this same class of scale insects, is the pernicious San Jose scale which on account of its importance, is treated of in a separate article.

Another enemy of fruit trees which has this year for the first time appeared in the Dominion, is the Pear-tree Flea-louse, (*Psylla pyricola*, Forster), specimens of which were sent in from Freeman, Ont., by Mr. J. S. Freeman, who writes: "I have a block of 300 dwarf Duchess pear trees mixed with apple trees, which are so badly affected with the insects which I am sending you, that from the appearance of the trees at present, the whole crop will be destroyed. I do not think that the pear trees have been troubled before this season. They are more or less over the pear trees of different kinds in my nine-acre orchard. From inquiries of other fruit-growers in this section, I think it likely that this pest occurs in other orchards too." At the time of receiving the specimens the insect was in the pupal form and just about to assume the perfect state. Mr. Freeman was written to as to the nature of the insect, and he was recommended to spray his trees with kerosene emulsion at the time, and to repeat the application early next spring when the buds burst, that being the season when the young hatch from eggs laid by females which are now hibernating on the trees. This has been found to be the most successful treatment.

The Pear-tree Flea-louse belongs to the same class of insects as the aphids or plant lice, with which they form the second section of the *Homoptera*, known as *Dimera*, or those with two-jointed feet. In this section we find small insects with antennæ longer than the head and in the winged individuals four wings, ordinarily all of the same membranous texture. The *Psyllidæ* or flea-lice are small insects found on leaves and in some species, as the Hackberry flea-louse, give rise to galls. They have long slender antennæ terminated by two bristles. The beak is short and tri-articulate, and the eyes are lateral and prominent as in the *Cicadae*. In fact, these little flea-lice, although seldom much more than one line in length, very much resemble *Cicadae* in miniature. On the front of the face are three ocelli placed in a triangle, the posterior ones quite close to the eyes. Unlike the *Aphides* or plant lice, the flea-lice have the power of leaping, from which they take their English name.

The Pear-tree Flea-louse is an introduced insect which was first recorded as injurious in America in 1833, according to Dr. Harris. It seems to be widely distributed in the Eastern United States and occasionally has developed into a serious pest. It has been treated of at various times by Dr. Lintner, Dr. J. B. Smith and the Washington Entomologists. The most important articles are those by Prof. Lintner in his Ninth Report and Prof. Slingerland in Bulletin 44, Cornell Univ. Agr. Exp. St., October, 1892, where a complete account is given of its life history and habits.

The presence of this insect is easily detected by the copious secretion of honey dew with which the leaves of the infested trees are covered and which soon becomes covered with the dirty looking black fungus (*Fumago salicina*), and also, after a time, by the falling of the foliage. The insect itself is about one-tenth of an inch in length, of reddish brown colour, with broad black bands across the abdomen, with transparent wings, the fore wings bearing one large vein which is divided into three forks, which again are bifurcated at the extremities. The immature insect, when first hatched, is a curious flattened oval creature, semi-translucent, yellow and very inconspicuous, only one-eightieth of an inch in length. It grows rapidly and in about a month passes through the five nymph stages, the last two of which are called the pupal stages and have black wing pads and blotches of the same colour on the body. Dr. Lintner records at least four broods during the season. An encouraging feature noticeable in all the accounts of this insect is the irregularity of its appearance, its occurrence in large numbers one year very seldom indicating that it will be as abundant the next.

Another very troublesome enemy of the fruit-grower is the Cigar Case-bearer of the apple (*Coleophora Fletcherella*, Fernald), which has been sent in from several places in Ontario and the Maritime Provinces. The first specimens were from Mr. Edwin Worden, of Oshawa, Ont., who in March sent twigs of apple trees thickly infested with the hibernating larvæ of the case-bearer, and the cocoons of the interesting little moth *Micropteryx pomivorella*, Pack. Specimens of the former came also from the Grimsby district, where it was stated that Greenings suffered most. Later in the year I had a visit from Mr. Harold Jones, of Maitland, Ont., who has suffered much from this small but very troublesome insect. He estimates his loss at fully the average fruit of one hundred trees. This has proved an extremely difficult insect to control. The life history is as follows:

The eggs are laid by the tiny moths during July. The young larvæ hatch in about a fortnight, and burrowing into the leaves, feed upon the parenchyma for a short time. They then cut out from both surfaces of the leaf oval pieces of the epidermis, with which they form their curious cases. Mr. Jones observed the young larvæ beneath the leaves about the 10th of August, and by the 1st of September they were clustered on the twigs. Here they remain all the winter with their curved cases, fastened securely to the twigs with white silk. As soon as the buds open in spring, they crawl out on the twigs and attack the unfolding leaves and flowers. As the leaves get larger, they confine themselves to the leaves, feeding chiefly on the undersides, where they bore a circular hole through the epidermis and extending their bodies into the cavity between the upper and lower surfaces, make large blotch-mines. They also do much harm by attacking the stems of the flowers and forming fruit. About the third week in June the larvæ crawl to the upper surface of the leaves, and, having fastened their cases down, change to pupæ inside them; the very small dark brown moths, a quarter of an inch in length, appearing from the second week to the end of July.

The remedy, which has been tried for this insect with the greatest success, is spraying with kerosene emulsion early in spring. Dr. Young, of Adolphustown, who suffered much from this insect, writes me on July 3rd last: "On the large block of Duchess apple trees, where we sprayed with Paris green in 1891 and '92, when the case-bearers were so numerous, there is now only an odd worm to be seen; but in other parts of the orchard, where they had scarcely reached at first, they were numerous this spring. The kerosene emulsion, either warm or cold, used in the winter had no effect; but when used cold in the spring, after the worms began to move about, was very effectual. It more completely cleaned the trees of the case-bearers than did the Paris green. Still the Paris green did well, and took most of them off. We sprayed with both the same day." It is

rather remarkable that this insect, in Nova Scotia and Prince Edward Island, attacks the plum and pear as well as the apple; but at Oshawa, Mr. Worden reports that, although he has plum and pear trees side by side with his apple trees, the latter alone are attacked.

An insect which has caused considerable damage to fruit growers is the Oblique-banded Leaf-roller (*Cacocia rosaceana*, Harris). Fig. 53 represents the moth with open wings; fig. 54, with wings closed; fig. 55, caterpillar and chrysalis. It is frequently a troublesome pest on apple trees and currant bushes. This year it was sent to me as an enemy of the birch, apple, pear, gooseberry, black currant, garden geranium, and a rare



Fig. 53.

Fig. 54.

Fig. 55.

Oblique-banded Leaf-roller.

interesting attack was noted in which it was destroying the seeds only of the silver maple. In fact this insect seems to be a pest upon a large number of shrubs and trees, upon any one of which it may develop injuriously under special circumstances. The general practice of spraying fruit trees with the arsenites, for the codling moth and the leaf-eating insects, will certainly reduce largely the occurrence of the Oblique-banded Leaf-roller.

The peach orchards in the Niagara district have, during the past two years, suffered seriously from the Peach Bark-beetle (*Phloeotribus liminaris*, Harris). Careful experiments have been begun in the extensive orchards of Mr. C. E. Fisher and Captain J. Sheppard, at Queenston; and it is hoped that before long a practical remedy will be discovered. It has usually been stated that this insect attacks only injured or dying trees; this, however, is certainly not the case, for it was found in perfectly healthy and thrifty young two-year-old peach trees; although very much more abundantly in older trees with rough bark. Its ravages are chiefly confined to the peach; but, at Queenston, specimens were found in both cherry and plum. There are at least two broods in the year. The perfect beetles hibernate in shallow galleries in the bark; they are active very early in the spring, and on warm days, even in February and March, come out of their burrows. Mr. Fisher wrote me on March 13th last: "I examined the trunks of the trees, as you suggested, on a sunshiny day, and found beetles crawling with their wings set for flying. As you know, ordinarily they do not appear as if they had wings; but these had them out ready for use. The presence of this insect is conspicuously evident in wet weather, when enormous quantities of gum ooze from the trunks and fall to the ground. The work of both the larvæ and the perfect beetles seems to be confined, at Queenston at any rate, to the bark. Not a single instance of penetration of the wood could be found, although this latter attack is recorded by some observers.

The remedies which have been tried are, washing the trunks with kerosene emulsion, linseed oil, and whitewash containing Paris green. The results have been rather conflicting, but there is every reason to think that before long a sure means of prevention will be found.

Another insect, which was received from the Queenston district, and also from Fenwick, Ont., is the Otiorhynchid beetle (*Anametis grisea*, Lec). Mr. Fisher found specimens upon his peach trees, but was under the impression they did not do him much harm. Mr. E. S. Atkins, of Fenwick, however, suffered more severely; he writes: "Last year they killed 130 young peach trees for me, and ate out four rows of strawberries extending

across a six-acre field. They only attack the very first leaf-buds and the bark of the young trees when first set out; or when a young tree is budded and cut off near the ground, by eating the bud they destroy the tree. In many of their habits they resemble the potato beetle, such as letting themselves drop to the ground and lying apparently dead; and in warm sunny days they move about and eat, and on cold or wet ones they lie concealed at the root of the tree in the earth. When the beetles are most destructive, there is nothing to spray, as the top is cut off, and it is a mere switch with nothing to hold the mixture." As these beetles are wingless, and have to climb up the stems of trees to attack them, any mechanical means of prevention, such as a band of cotton batting or one of the various kinds of tree protectors, placed around the trunks at the time the perfect beetles occur, would prevent injury by the mature insects. In the case of young budded stock, a strip of tin bent into a ring about four inches in diameter, and pressed into the ground around the base of the stem, similar to those now so generally used by gardeners for cut-worms, might be serviceable.

I am informed by Dr. J. Hamilton that he has bred this beetle in Pennsylvania from the stems of the Rag-weed, *Ambrosia trifida*, where the larva had lived as a borer; but I think it must have some other larval habit in Canada, as this plant is only an accidental weed in a few places in Ontario.

The Spotted Paria (*Paria sexnotata*, Say,) is another beetle which requires mention as a serious pest of the raspberry. It has given great trouble on some of the fruit farms in the neighbourhood of Grimsby and St. Catharines for several years past. It was first brought to my notice by Mr. Martin Burrell, of St. Catharines, and was so difficult to control that he eventually ploughed out the whole of the infested patch. He wrote in 1892: "My old enemy, *P. sexnotata*, has revisited me this spring in greater numbers than ever. I sprayed with Paris green, 4 ounces to 30 gallons, but the foe still 'bobbed up serenely.' Of a quarter of an acre of my raspberries not a score of canes have leafed out. I am not the only victim this year, as several of my neighbours have been severely injured by the beetles."

Mr. John Craig, Horticulturist, of the Central Experimental Farm, found this insect also very abundant early in May, in raspberry plantations on the road between Hamilton and Grimsby; and Mr. Linus Woolverton, the energetic secretary of the Fruit Growers' Association of Ontario, sent me last spring specimens, with the report that they were doing much harm about Grimsby by eating out the fruit buds of raspberries, and thus destroying the crop. The following answer was sent to him: "The beetles you send are the Spotted Paria. This is a most injurious insect, and has done much damage in the way you describe, at St. Catharines. It seems to be very difficult to kill. I would suggest your dusting the raspberry bushes at once with Paris green and slaked lime, 1 pound of Paris green to 25 of lime. This mixture is easiest applied by putting it in a bag of cheese-cloth and shaking or tapping it over the bushes. Of course, if you can get a morning when there is a dew on them, so much the better. The beetles may also be killed in large numbers by beating or shaking them off the canes into an open pan containing water, with a little coal oil on the top. A good plan for collecting them is to hold an open and inverted umbrella beneath the canes when beating them, and then brush the insects out into the coal oil pan."

The Spotted Paria does not confine its attacks to the raspberry alone, but is occasionally troublesome to strawberries. In 1874, Mr. John McGrady, of Gatineau Point, Que., suffered a disastrous attack upon his strawberry beds. He found that hellebore was quite useless against the enemy; and my experience is that much stronger poisons are necessary for this beetle than for many others.

There have been, of course, many of the well-known fruit pests complained of from various parts of the province, but, with perhaps the exception of the Bud Moth in the Grimsby and London districts, and *Bucculatrix pomifoliella* in western Ontario, no others demand special mention here.

SIXTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.*

The Association met at 10 a.m. in Room 12 of the Packer Institute, Brooklyn, N.Y., August 14th, 1894. The following officers and members were present:

President, L. O. Howard, Washington, D. C.; Vice-President, J. B. Smith, New Brunswick, N.J.; Acting Secretary, C. L. Marlatt, Washington, D.C.

Messrs. William H. Ashmead, Washington, D.C.; Geo. F. Atkinson, Ithaca, N.Y.; Nathan Banks, Sea Cliff, N. Y.; D. W. Coquillett, Washington, D.C.; Geo. C. Davis, Agricultural College, Mich.; A. D. Hopkins, Morgantown, W.Va.; Geo. H. Hudson, Plattsburg, N.Y.; J. A. Lintner, Albany, N.Y.; V. H. Lowe, Jamaica, N.Y.; F. W. Raine, Morgantown, W.Va.; William Saunders, Ottawa, Canada; E. B. Southwick, Central Park, New York City; F. A. Serrine, Jamaica, N.Y. There were also in attendance upon the meetings visitors and members of other scientific societies, the average attendance being twenty-five persons.

The meeting was called to order by the President, and in the absence of the Secretary, Mr. Gillette, Mr. C. L. Marlatt was elected Secretary for the meeting.

The President, Mr. Howard, then delivered his annual address as follows:

A BRIEF ACCOUNT OF THE RISE AND PRESENT CONDITION OF OFFICIAL ECONOMIC ENTOMOLOGY.

BY L. O. HOWARD, WASHINGTON, D. C.

When this Association was founded, in 1889, the name adopted was "The Association of Official Economic Entomologists," and its objects as outlined had evidently especial reference to the work of those economic entomologists who hold official positions. At the first annual meeting, held in Washington in November of the same year, Dr. Lintner, with the evident idea of broadening the scope of the Association, introduced an amendment to drop the word "official" from the title, and this amendment was adopted at the meeting at Champaign, Ill., the following year. Notwithstanding this fact, the membership of the Association is to-day largely official; out of 73 members 60 hold official positions, while the active work is all done by those with whom economic entomology is a means of subsistence. At the last meeting, held in Madison, Wis., in August, 1893, every member registered belonged to the official class.

The organization meeting at Toronto on the 30th of August, 1889, presented a strange contrast to this. It was held, as may not generally be known, upon a wooded knoll at a landing called Scarborough Heights, overlooking the waters of Lake Ontario. The beach below and the woods around were being scoured by industrious collectors of the old section F, of the American Association for the Advancement of Science. Professor Cook, who presided, occupied a dignified position astride a fallen log. Dr. Smith, who acted as secretary, had climbed with difficulty to the top of a tall stump and took his minutes on his knee. Dr. Bethune, Mr. Fletcher, Mr. E. Baynes Reed, Mr. H. H. Lyman, Prof. C. W. Hargitt, Mr. E. P. Thompson, and the writer reclined with more or less grace, according to their physical conformation, upon the ground or sat cross-legged upon convenient ant-hills. This group, which made the Association "official" in name, was composed of four official entomologists and five who were simply interested workers.

*Through the kindness of Mr. L. O. Howard, Entomologist of the Department of Agriculture, Washington, D.C., and Mr. C. L. Marlatt, Acting Secretary of the meeting, who prepared an abstract of the proceedings for the *Canadian Entomologist*, we are enabled to give the following account of this interesting meeting as well as some of the papers in full.—ED.

This brief historical paragraph is introduced for the purpose of showing the interesting paradox that this Association was originally made official by non-officials, that it was subsequently made non-official by officials, and that since it was made non-official it has become more official than before.

It is in part for this reason that I have chosen to bring together for presentation at this meeting some account of the rise and present condition of official economic entomology, but more largely for the other reasons that few of us probably have been able to take a comprehensive view of the status of our application of entomology the world over, and that a review of what has been done can not but justify our existence as a class and as an association and afford the strongest of arguments for the increase of our numbers and for increase of means and facilities.

The ravages of insects on cultivated plants were doubtless coetaneous with the beginning of the cultivation of plants. Thus a necessity for economic entomologists existed at a very early time. The condition of the ancient husbandman with reference to injurious insects is voiced by the prophet Joel, when he says :

That which the palmer-worm hath left, hath the locust eaten ; and that which the locust hath left hath the canker-worm eaten ; and that which the canker-worm hath left hath the caterpillar eaten. * * *
He hath laid my vine waste and barked my fig tree ; he hath made it clean bare and cast it away ; the branches thereof are made white. * * * The field is wasted, the land mourneth. * * * Be ye ashamed, O, ye husbandmen ; howl, O, ye vinedressers, for the wheat and for the barley, because the harvest of the field is perished.

In 1881 Dr. Hagen published in the columns of the *New Yorker Belletristisches Journal* (August 16) an interesting article entitled "Heuschrecken Kommissionen in Mittelalter und heute," in which he showed that grasshopper invasions have taken place since time immemorial, and that man's efforts to combat them have always ended in his discomfiture. It is not surprising, therefore, says Dr. Hagen, that the helpless multitude called on the intervention of the law and of God to deliver them from such pests ; and the legislators on one side and the priests on the other were forced to carry out the will of the people. But since written laws and legislative decrees against elemental plagues would have been ridiculous without a surrounding of imposing, legally regulated forms, the development of these formalities gradually reached a high degree of perfection. Legislation for defense against injurious animals reached its highest development in the Middle Ages. Legal procedures against all sorts of noxious animals were frequent, and the famous Burgundian legal light, Bartholomæus Chassanæus, wrote a book setting forth the rules according to which a suit against grasshoppers should be entered. After a court had been called together by written request, a judge was appointed and two lawyers were elected, one to plead the cause of the people and one the cause of the accused grasshoppers. The former commenced by formulating the charge, and concluded by requesting that the grasshoppers be burned. The defendant's lawyer replied that such a request was illegal before the grasshoppers had been requested in due form to leave the country. When, however, they had not left the country after a stated term, they could be excommunicated. Many years afterward, another jurist, Hiob Ludolph, wrote a pamphlet antagonizing Chassanæus's work, setting forth the lamentable legal ignorance displayed by the latter. The accused grasshoppers, said Ludolph, must be summoned four times before the court, and if they do not appear, then they should be dragged by force before the court. Then only can the suit proceed. Other interested parties, however, shall be heard, namely, the birds that feed on the grasshoppers. Further, it would be a great injustice to banish the grasshoppers into adjacent territories. Finally, the code proposed by Chassanæus can never be brought into accordance with the laws and rules of the Church, because there is absolutely nothing in those laws about suits against grasshoppers.

Several suits against injurious insects were brought before the courts, and the rulings have been preserved. In one case (1479) a suit was brought against injurious worms, apparently cut-worms, in the canton of Berne, Switzerland. The worms, although ably defended, lost the suit, and were excommunicated by the archbishop and banished. Regarding the effect of this awful punishment, the chronicler who relates the story adds : "No effect whatever resulted, evidently on account of the great depravity of the people."

In various other law suits the chroniclers fail to mention the final outcome; but, says Hagen, it is safe to surmise that in the whole history of jurisprudence there was never a greater disregard for the rulings of the courts on the part of the guilty parties than during the time of the mediæval insect commissions.

To attempt to enumerate the different commissions which have been established, particularly by European countries, against particular outbreaks of injurious insects, and especially against locusts, which have entered Europe from the south and from the west at intervals for many hundreds of years, would be impossible, and even if possible, would extend this paper far beyond its proper length. I shall be obliged, therefore, to neglect this phase of the subject and confine myself rather to the history of the more prominent organizations of wider scope, and these I shall treat geographically and chronologically, beginning with our own country.

THE UNITED STATES.

MASSACHUSETTS. Dr. Thaddeus William Harris was probably the first American entomologist to receive public compensation for his labors, and in this sense he may be called the first of the official entomologists in this country. In 1831 he prepared a catalogue of insects, appended to Hitchcock's Massachusetts Geological Report. "In the condition of American science at that day," says Scudder, "it was a work of inestimable value, though his only material compensation was one copy of the report and several copies of the appendix." At a later period he was appointed by the State as one of a commission for a more thorough geological and botanical survey. In this capacity he prepared his now classic report on insects injurious to vegetation, first published in full in 1841, the portion upon beetles having appeared in 1838. He reprinted the work under the name "Treatise" instead of "Report" in 1842, and again, in revised form, in 1852. The whole sum received by him from the State for this labor was \$175. After his death the work was reprinted by the State in its present beautiful form, with wood engravings which themselves marked an epoch in that art. It is largely upon this work that Harris's scientific reputation will rest, and, although prepared more than half a century ago, it is to-day perhaps above all other works the *vade mecum* of the working entomologist who resides in the northeastern section of the country,

From 1852 to 1870 Massachusetts did little or nothing in economic entomology. In the latter year, however, Dr. A. S. Packard, jr., then of Salem, was appointed entomologist to the State Board of Agriculture—without compensation, however, as he informs me. Dr. Packard published three reports covering the years 1871, 1872 and 1873. They were short pamphlets, but were ably prepared, and were undoubtedly productive of very considerable good.

With the founding of the State Agricultural Experiment Station under the Hatch Act, Prof. C. H. Fernald, professor of zoology at the Massachusetts Agricultural College at Amherst, was appointed entomologist to the station. Prof. Fernald's work has been practically like that of most other station entomologists, and he has published several important bulletins. The ones for which there has been the greatest demand are No. 5 on household pests, which was the outgrowth of original studies which Prof. Fernald had made in this direction, and No. 12 containing the work upon the bud moth, spittle insects, and several other injurious species, all based upon original observation. The most important portion of his work has not yet been published. It comprehends the scientific results of his observations as entomological adviser to the gypsy moth committee of the State board of agriculture. That these results will prove of great value the writer is in full position to assert, as he has had the pleasure of seeing many of Prof. Fernald's experiments in the course of procedure, and has been greatly impressed by the ability and care with which they are being carried on. Prof. Fernald has also for some years held the position of entomologist to the State Board of Agriculture.

The work upon the gypsy moth, by the way, which has been done by the State of Massachusetts since 1889 is one of the most remarkable pieces of work, judging by results, which has yet been done in economic entomology. The operations have been carried on by a committee of the State Board of Agriculture and the means have been furnished by

large annual appropriations by the State legislature. Three hundred and twenty-five thousand dollars have already been appropriated. A territory comprising something over 100 square miles was infested by the insect, which occurred in such extraordinary numbers as to destroy many trees and almost to threaten the ultimate extinction of living vegetation, not only within the infested territory, but in all localities to which it might spread. It is unnecessary to detail the steps by which relief was brought about. Mistakes were undoubtedly made at first, and it is to the work of the present committee that the main credit is due. The infested territory has been reduced by one-half, and within the districts in which the gypsy moth at present exists it is, practically speaking, a comparatively rare species. The future of the insect is, however, problematical. The continuance of sufficiently large appropriations from the State legislature to enable the work to be carried on on its present scale is doubtful, yet those in charge believe that still larger appropriations are necessary to bring about extermination. They are confident, however, that with sufficient means the insect can be absolutely exterminated from the State of Massachusetts. With the legislature disinclined to continue the large appropriations, the methods of the committee at present pursued will have to be seriously altered. Given a small appropriation of say \$25,000 annually, it will become necessary to adopt some law, like that in force in California, whereby much less frequent inspection may be made, and the committee will have to rely in part upon voluntary observers for information. Moreover, they will be unable to conduct spraying operations upon a large scale, and the expense of the destruction of insects will have to be assessed upon the owners of the property upon which the insects are found, provided such owners will not themselves undertake the destruction of the insects. There will be many disadvantages from such a course, and in the case of unproductive lands the expense will be so great that the owner will prefer confiscation. Between some such course as this and the continuance of the present methods, however, there seems to be little choice, since if the appropriation were taken away the insect will not only speedily reach its former destructive height, but will spread far and wide over the country. It may be urged that it will be only a few years before the insect will take its place as a naturalized member of our fauna and will become subject to the same variations of increase and decrease as our native species, and that it will, in fact, become little more to be feared than species already existing with us, particularly if its European natural enemies are introduced. Against this view, however, it must be urged that the gypsy moth seems an exceptionally hardy species and that even in Europe it is a prime pest. The caterpillar is tough and rugged and seems little subject to disease and to climatic drawbacks and is wonderfully resistant to the action of ordinary insecticides. The gypsy moth larva will feed for days without apparent injury upon trees which have been sprayed with Paris green or London purple in a solution so strong as to somewhat burn the leaves. In fact, the committee, in the spraying which they are carrying on at present, have found it necessary to use arsenate of lead in as strong proportion as 10 pounds to 150 gallons of water. The well-known vitality of previously introduced European injurious insects is apparently increased to a striking degree with this species, while the fact that it feeds on nearly all plants renders it a much more serious pest than any of its forerunners. Under these circumstances, therefore, any course other than an energetic and well-directed effort to keep the insect within its present boundary will be shortsighted in the extreme, although it is very doubtful to my mind whether absolute extermination will or can ever be brought about.

NEW YORK. It is rather a stretch of the facts to classify Dr. Harris as an official entomologist. The first scientific man to receive a true official commission for the investigation of injurious insects was Dr. Asa Fitch, of New York. The New York State legislature, during the season of 1853-54, made an appropriation of \$1,000 for an examination of insects, especially of those injurious to vegetation, and authorized the appointment of a suitable person to perform the work. The matter was placed in the hands of the New York State Agricultural Society, and at a meeting of the executive committee of the society, held at the Astor House, in New York City, May 4, 1854, the following resolution was passed:

Resolved, That Asa Fitch, M.D., of Washington County, be appointed to perform the work; that he be furnished with such accommodations as he may desire in the rooms appointed for the laboratory in charge of the society; and that the president and Mr. Johnson, the corresponding secretary, be a committee to prepare instructions for such entomological examinations.

Mr. William Kelly, at that time president of the New York State Agricultural Society, and Mr. B. F. Johnson, its corresponding secretary, performed their duties in the preparation of these instructions in the most admirable manner. In fact, so well were they performed that we imagine Dr. Fitch himself may have drafted the report which was signed by these gentlemen. So far as we are aware, no subsequent appointment of an official entomologist has ever been accompanied by such a full, explicit, and able paper, and for this reason we quote it in full :

As our State has had a thorough examination made of all branches of its natural history except its insects, it is of the highest importance that the remaining branch—not less in importance than the others—should receive attention. The committee feel assured that in the selection of Dr. Fitch they have secured a person every way competent to discharge the duties imposed in a manner creditable to the society and the State.

In carrying out this examination it is desirable that equal prominence be given to economical as well as to scientific entomology, that being the part of this science which is specially important to the community at large. It has been objected to the volumes of the Natural History of the State that they are too purely scientific in their character to be of special value to the great mass of our citizens, and in the work now to be performed it is obvious that it will be of very little consequence to know that a particular kind of moth or fly is an inhabitant of this State unless we are also informed of its history and habits, and whether it is a depredator upon any substance which is of value to man. The habits and instincts of our insects are a proper subject of inquiry as much as their names and marks by which they are distinguished from each other. The whole history of every noxious species should at least be traced out as fully as circumstances will permit.

The examiner is therefore directed, in the first place, to make for the present season the insects which infest our fruit trees the leading object of examination. Those infesting our forest trees, our grain and other crops, our garden vegetables, our animals, etc., will remain to be studied hereafter. The examiner is desired in his examinations to search out every insect which is a depredator upon our apple, plum, pear, cherry, peach and other fruit trees, and study out all the facts in the history of each species, both in its larva and in its perfect state, as far as he shall have opportunity to do so. In this way a broad foundation will be laid, to which additions can be made which future observations may show to be necessary.

Should any important insect depredator appear the present season in any other situation than upon the fruit trees, the opportunity for studying it should not be neglected, for the same species may not appear again in many years under circumstances as favorable for becoming acquainted with its real history.

Secondly, what time is not necessarily occupied in examining the insects infesting our fruit trees should be devoted to collecting and classifying the insects of the State, and to naming and describing such species as have not been described.

A report to be prepared at the end of the season, to be submitted to the legislature, showing what has been accomplished during the season, to be divided into two parts. The first, upon economical entomology, giving an account of all that has been ascertained respecting the insects infesting our fruit trees, and any other injurious species that may have been obtained. The second, upon scientific entomology, giving a systematically arranged catalogue of all the insects of the State, so far as they are known, with a brief description of such new and undescribed as may be discovered.

The work should be pursued with a view of eventually securing to the State as full and complete accounts of all the insects of this State as far as to place this important science (which is at the present so greatly in the background, and so partially and imperfectly explored on this side of the Atlantic) in as perfect a position and as favorable a situation for being acquired as its nature will admit of. Should there be time, in addition to the above, to perform other labor, it is desired :

Thirdly, that a commencement should be made in writing out full descriptions of the species pertaining to some particular order, with observations upon the time of appearing, habits, etc., with a view of future publication, so as to secure a complete account of all the insects of the State pertaining to that order.

Lastly, suits of specimens to fully illustrate both the economical and scientific entomology of the State should be gathered in connection with the other parts of this work, to be placed in the Cabinet of Natural History; and in the Agricultural Museum specimens of the wood, leaves and fruits; and other substances depredated upon by each and every species of our noxious insects, showing the galls or other excrescences which they occasion, the holes or burrows which they excavate, the webs or other coverings for themselves which they construct, with preserved specimens of the worms, caterpillars, etc., by which each of these deformities is produced.

Such further examination as Dr. Fitch may deem necessary to carry out fully the objects desired to be accomplished, as from time to time may be deemed advisable, the committee desire may be made.

WILLIAM KELLY,
B. F. JOHNSON,
Committee.

Dr. Fitch, while not officially designated as State entomologist of New York, was always given this title by courtesy, and continued in office until 1871 or 1872, when his fourteenth report was published, and when the infirmities of age affected him to such an extent that he could no longer continue his investigations. The reports were published in the Transactions of the State Agricultural Society from 1854 to 1870, skipping the years 1859, 1865 and 1868. The first eleven have been published separately, as well as

in the transactions of the society. In 1873, through an appropriation by the State legislature, provision was made for the revision and republication of the reports, and the revision was completed by Dr. Fitch. The resolution for printing, however, failed of the concurrence of the senate, and since that time the manuscript has been lost.

The value of Dr. Fitch's labors has been very great. In his fourteen reports the great majority of the injurious insects of the State of New York received more or less detailed consideration, and in the majority of cases the life histories of the insects treated were worked out with great care and detail. The remedial measures suggested by Dr. Fitch have, however, been largely improved upon, and the practical value of these reports to day rests almost entirely upon the life-history side.

From the time of the publication of Dr. Fitch's last report, in 1872, the State of New York did nothing for the encouragement of economic entomology until 1881, when the legislature, on April 14, passed an act to provide for the appointment of a state entomologist. The law reads as follows :

No. 316.]

SENATE OF NEW YORK,

In Senate, April 14, 1881.

Introduced by Mr. Fowler ; read twice and referred to the committee on finance ; reported favorably from said committee and committed to the committee of the whole.

AN ACT to provide for the appointment of a state entomologist and fixing his compensation.

The people of the State of New York, represented in Senate and Assembly do enact as follows :

SECTION 1. There shall be appointed, by the governor, a state entomologist, who shall be charged with the study of insects injurious to agriculture and of methods for controlling and preventing their depredations.

P. 2. The salary of the entomologist shall be two thousand dollars, and he shall render an annual report of his labors and investigations to the legislature and shall arrange for the state museum of natural history a collection of insects taken in the course of his investigations.

P. 3. This act shall take effect immediately.

(Senate No. 316).

(I. 520, G. O. 391).

(Chap. 377 of the Laws of 1881. Passed May 26, 1881, three-fifths being present.)

The movement which resulted in the passing of this law was started by the regents of the University of the State of New York at their annual meeting in 1877, and the person appointed to fill the office was Dr. J. A. Lintner, a well-known worker in entomology, who, up to that time, had been connected with the State Laboratory of Natural History. Dr. Lintner has held office continuously since 1881. He brought to bear upon his duties a ripe experience and a mind trained in scientific methods. He has published nine reports, the last one covering the year 1892, and only recently distributed. These reports are in many respects models. The great care and thoroughness of the author have hardly been equalled by any other writer upon economic entomology. The form of the reports is most admirable, and the account of each insect forms almost invariably a complete compendium of our knowledge concerning it down to the date of publication. His accounts are also arranged in the most convenient form for reference, a full bibliography precedes the consideration of each species, and the frequent subheadings enable the most practical use of the report. The reports are replete with sound and ingenious practical suggestions, and are written in a straightforward, simple style, which possesses great literary merit. They abound in illustrations, and are made available by most complete indices and tables of contents. Aside from these reports, Dr. Lintner has published a great deal in the newspapers, particularly the "Country Gentleman," on the subject of economic entomology, and another valuable feature of his reports is the comprehensive list which he publishes each year of his unofficial writings.

The Cornell University Agricultural Experiment Station was established by the authorities of the university in 1879, and its first annual report contained a series of miscellaneous entomological observations by the acting professor of entomology Dr. W. S. Barnard. The second report, issued in 1883, contained an elaborate monograph of the *Diaspidæ* by Prof. J. H. Comstock, and an important article on the *Tineidæ* infesting apple trees by Mr. A. E. Brunn, a student of the Department of Entomology. With the establishment

of the agricultural experiment stations under the Hatch bill, in 1888, this experiment station became governmental in its character, and Prof. Comstock was naturally made entomologist. Since that date he, or his assistants, have published a number of very important bulletins, the first one, on "A Sawfly Borer of Wheat," by Prof. Comstock; the second on Wireworms, by Prof. Comstock and his assistant, Mr. M. V. Slingerland, and the later ones mainly by Mr. Slingerland. These are among the best and most practical of the experiment station bulletins that we have. They are characterized by almost a superabundance of detail and plainly by great care. The illustrations are very nearly all original, and are excellent.

THE U. S. DEPARTMENT OF AGRICULTURE. Almost simultaneously with the appointment of Dr. Fitch to do entomological work for the State of New York, came the appointment of an entomological expert under the General Government. On June 14, 1854, Mr. Townend Glover was appointed by the Commissioner of Patents to collect statistics and other information on seeds, fruits and insects in the United States, under the Bureau of Agriculture of the Patent Office. Mr. Glover was one of the most eccentric individuals who have ever done important work on North America insects. He had led a roving and eventful life as a boy in Brazil, as a clerk in a draper's shop in England, as an artist in Germany, as a roving traveller and naturalist in all parts of the United States, and finally as a landed proprietor with horticultural tastes on the banks of the Hudson in New York. Pomological interests brought him to Washington shortly before the time when he received his appointment. His first report was published in the Report of the Commissioner of Patents for 1854, was illustrated by six plates engraved on stone by the author and comprised some consideration of the insects injurious to the cotton plant, wheat, and the grapevine, and on the plum curculio, codling moth, and peach borer, closing with some account of the more common species of beneficial insects. His second report, in 1855, continued the consideration of the cotton insects, together with some accounts of orange insects. The reports for 1856 and 1857 contained nothing from him, but that for 1858 contains a rather full report on the insects frequenting orange trees in Florida, published over the initials D. J. B., which were those of the then chief clerk of the Bureau, with whom Mr. Glover had many serious disagreements, largely on the matter of credit, which resulted in his resignation the following year. In 1862 the Department of Agriculture was established as a separate institution, under the commissionership of the Hon. Isaac Newton, and in 1863 Mr. Glover was appointed entomologist to the Department. His annual reports follow consecutively from 1863 to 1877, and are storehouses of interesting and important facts which are too little used by the working entomologist of to-day. Their value for ready reference, however, is detracted from by a lack of systematic arrangement and poor paper and presswork, but many observations are to be found in the pages written by Glover which have subsequently been announced by others as original and important discoveries. There is, however, in Mr. Glover's reports, a lack of consecutive and full treatment of any one topic, and the subject of remedies seems seldom to have received original treatment or thought with him. This is largely due to the fact that his reports were matters of secondary importance to him, his main energies being devoted to the building up of a museum for the Department and to the preparation of his most elaborate series of illustrations of North American insects, a work upon which he expended enormous labor, and which unfortunately, up to the present time, has added to his fame nothing but the good opinion of a few of his scientific contemporaries.

In 1877 Mr. Glover's health suddenly failed him. His report for that year was largely prepared by his able assistant, Mr. Charles Richards Dodge, who, by the way, is the author of the charmingly written account of Mr. Glover's life, published as Bulletin 18 of the Division of Entomology of the Department of Agriculture. Mr. Glover lived for several years afterwards, but was unable to do further work. He died in Baltimore in 1883, and the writer and Profs. Uhler and Riley were the only entomologists present at the funeral services of this, in many respects, remarkable man.

The year 1878 marked a new era in the governmental entomological work. Prof. C. V. Riley, a comparatively young man, who had already become famous by the admirable work which he had done as entomologist of the State of Missouri, and as chief of the

U. S. Entomological Commission, was that year appointed successor to Mr. Glover by the Hon. William G. Le Duc, then Commissioner of Agriculture. Prof. Riley took hold of his work with his accustomed vigor, and, during the nine months that he remained in office at that time, accomplished a great deal. His report for the year 1878, though short, is by far the most practical one which the Department had published up to that time. On account of a misunderstanding with the Commissioner, Prof. Riley resigned his commission in May, 1879, and Prof. J. H. Comstock, of Cornell University, was appointed in his stead. Prof. Comstock remained in office until May, 1881. He completed the investigation of the cotton worm, begun by Prof. Riley, and published a thoroughly practical and useful volume entitled "Report upon Cotton Insects," early in 1880. In addition to this report he published extensive annual reports covering the years 1879 and 1880, which rival in thoroughness and practicality the Missouri reports of Prof. Riley and those which were issued by the Department after his resignation. The report for 1880 is marked by the publication of the results of a preliminary investigation of the insects affecting the orange, and more especially by an elaborate report upon scale insects, which formed the basis of the study of this important and very destructive group of insects in this country. Upon the change of administration in 1881, Prof. Comstock was retired, with a year's commission as investigator, and Prof. Riley resumed charge of the governmental entomological work. From that time until June, 1894, Prof. Riley remained consecutively in office. The work which he has accomplished has been of the highest order, and has been largely instrumental in placing the science of economic entomology in this country upon its present sound footing. During the course of his administration of the office he has published 12 annual reports, 31 bulletins, 2 special reports, 6 volumes of the periodical bulletin "Insect Life," and a large number of circulars of information. He has developed not only the scientific side of the work, but also the practical side. Under his direction advances have been made both in insecticides and insecticide machinery, which are of the most far-reaching importance. The earlier work of Prof. Riley will be mentioned in another place, but it will be appropriate to state here that no other name in the annals of North American economic entomology stands out with the same prominence as his. His work has been called epoch-making, and this expression may be considered justified. His voluntary resignation at this time would be greatly to be deplored, were it not for the fact that, with the restoration of his health, which is confidently to be anticipated, he will resume his labors—in another capacity, it is true, but along entomological lines and with undiminished vigor.

Aside from the work of the Division of Entomology, the General Government has, upon one occasion only, provided for work in economic entomology, as have so many other governments, by the appointment of a special commission. The U. S. Entomological Commission was founded, by authorization of an act of Congress approved March 3, 1877, specifically to report upon the depredations of the Rocky Mountain locust in the Western States and Territories and the best practical methods of preventing its recurrence, or guarding against its invasions. The commission was attached to the U. S. Geological and Geographical Survey of the Territories under the charge of Prof. F. V. Hayden, and the office of chief was filled by the appointment of Prof. C. V. Riley by the Hon. Carl Schurz, then Secretary of the Interior. The other members of the commission, also appointed by the honorable Secretary of the Interior, upon consultation with Prof. Riley, were Dr. A. S. Packard, jr., of Massachusetts, secretary, and Prof. Cyrus Thomas, of Illinois. The commission remained in existence, supported by annual appropriations by Congress of varying amounts, until 1881. It published 5 reports and 7 bulletins. The first two of the annual reports related to the Rocky Mountain locust and allied migratory locusts, and form together probably the most complete monograph of any one insect ever published. The practical end was kept constantly in view, and the reports are thoroughly practical, as well as thoroughly scientific. In the appropriations for the year 1879 the commission was instructed to report upon cotton insects, and the results of the investigation thus brought about are published in the fourth report of the commission on the cotton worm and boll worm—another elaborate volume which cannot be too highly praised from all standpoints. The third report treats of a variety of topics and includes two important monographs, one upon the army worm and the other upon canker worms, while the fifth

report contains a full and comparatively exhaustive treatment of the subject of the insects injurious to forest and shade trees. The first, second and third reports are published under the joint authorship of the three commissioners, the fourth under the sole authorship of Prof. Riley, and the fifth under the sole authorship of Dr. Packard.

ILLINOIS. During the regular session of the legislature of Illinois, in the winter of 1866-'67, a law was passed enacting that a State entomologist shall, "by and with the consent of the senate, be appointed by the governor with a salary of \$2,000 per annum, for a period of two years, or until his successor is appointed and qualified." This legislation was the result of a petition from the State Horticultural Society, and on May 21, 1867, the society passed the following resolution :

That the president of the society be authorized to engage B. D. Walsh to immediately commence entomological investigations in relation to horticulture, and be empowered to pay out for that purpose a sum not exceeding \$500 from the legislative appropriation. This action is taken in case of failure to appoint.

At a special session of the legislature held in June, 1867, the governor sent in the name of Mr. Walsh for confirmation, but the senate postponed action upon it until the next regular biennial session in the winter of 1868-'69. Hence it follows that Mr. Walsh's first and only report was published as acting State entomologist, his untimely death occurring before his second report was prepared, its preparation having been delayed by a long period of ill-health which preceded the railway accident which was the immediate cause of his demise. Mr. Walsh was a retired farmer and lumber dealer of English university training, who for a number of years prior to his appointment had been industriously studying entomology and had written largely for the agricultural press upon the subject of injurious insects. Although not a naturalist by training, his work showed extraordinary powers of observation, and his published writings, as well as the statements of his contemporaries, indicate that he possessed a remarkable mind. In this connection, however, we have occasion to speak only of his official work as indicated in his one report. In this report, which is now unfortunately very rare, he treated particularly of the insects affecting the grape, the apple and the plum, and to this added, under the head of "Insects affecting garden crops generally," a chapter on the so-called "hateful grasshopper," or migratory locust, (*Caloptenus spretus*). His treatment of the other insects is very thorough and his work in a large part remains standard to-day.

Mr. Walsh's successor, Dr. William LeBaron, a practising physician of Geneva, Ill., well known for his writings on injurious insects in the agricultural journals of the time, and an able and conscientious entomologist, published four reports as appendices to the Transactions of the State Horticultural Society, from 1871 to 1874. The first three treated of miscellaneous insects, mainly those injurious to fruit and fruit-trees, while his fourth report, and part of his third, consisted of the beginnings of a work entitled Outlines of Entomology, of which he completed only the order Coleoptera. This portion however, was executed in the most scientific manner, and was fully illustrated, largely by original drawings by Prof. Riley. It has since been used to some extent in the class room, and has undoubtedly been the means of interesting many students in the subject of entomology. Dr. LeBaron's treatment of insects from the economic standpoint was careful and practical. He records in his first report the first successful experiment in the transportation of parasites of an injurious species from one locality to another, and in his second report recommended the use of Paris green against the canker-worm on apple trees, the legitimate outcome from which has been the extensive use of the same substance against the codling moth, which may safely be called one of the great discoveries in economic entomology of late years.

Dr. LeBaron died in harness, I believe, and was succeeded in office by the Rev. Cyrus Thomas, of Carbondale, who published a series of six reports, extending over the years 1875 to 1880. Mr. Thomas at the time of his appointment was a well-known entomologist, who had written extensively for the "Prairie Farmer" and other agricultural newspapers on the subject of economic entomology, and who had published an elaborate monograph of the Acridiidae of the United States as one of the special volumes of the Hayden survey of the Territories. He started with his first report, a manual

of economic entomology for the State of Illinois, including in this report the portion relating to the Coleoptera. In his second report his assistant, Mr. G. H. French, treated of the Lepidoptera, and in his third report Mr. Thomas treated the Hemiptera, monographing the Aphididæ. His fourth report included a consideration of one family of the Orthoptera, namely, the Acrididæ, and the fifth a paper on the larvæ of Lepidoptera, by his assistant, Mr. D. W. Coquillett, while in his sixth he was obliged, from the force of circumstances to abandon the scheme. The manual of economic entomology of Illinois remains, therefore, unfinished. In the course of the six reports a very large number of insects are treated from the economic standpoint. Mr. Thomas was able to employ several excellent assistants, and the six reports as a whole are very creditable to the State. The last of the six reports shows rather plainly the falling off in Mr. Thomas's interests in the subject of entomology. Its publication was coincident with the close of the work of the U. S. Entomological Commission, and it consists entirely of reports by Mr. D. W. Coquillett and Prof. G. H. French. After its publication Mr. Thomas transferred his labors to the field of ethnology, in which he had long been interested, and he is at the present time one of the able workers in the U. S. Bureau of Ethnology.

Upon Mr. Thomas's withdrawal from office, Prof. S. A. Forbes, director of the State Laboratory of Natural History, at Normal, Illinois, was appointed State entomologist, his commission dating July 3, 1882. Prof. Forbes's attention had for some time been more or less engaged by questions relating to economic entomology. He has held office continuously since that time, and has published six reports, the first one covering the remainder of the year 1882, the second the year 1883, the third the year 1884, the fourth the years 1885 and 1886, the fifth the years 1887 and 1888, and the sixth the years 1889 and 1890. Prof. Forbes's reports are among the best which have been published. They are characterized by extreme care and by an originality of treatment which has seldom been equalled. The practical end is the one which he has kept mainly in view. His experiments with the arsenites against the codling moth and the plum curculio were the first careful scientific experiments in this direction which were made, and his investigations of the bacterial diseases of insects have placed him in the front rank of investigators in this line. His monographic treatment of the insects affecting the strawberry plant is a model of its kind, and the same may be said of his work upon the corn bill-bugs and of his studies of the chinch bug. In fact, whatever insect or group of insects has been the subject of his investigations, he has attacked the problem in a thoroughly original and eminently scientific and practical manner. Prof. Forbes has been able to command the services of a very able corps of assistants, including Messrs. C. M. Weed, H. Garman, F. M. Webster, John Marten, and C. A. Hart.

MISSOURI. In the session of 1867-'68 the legislature of Missouri passed an act establishing the office of State entomologist, and directed that the reports of this officer should be made to the State Board of Agriculture. The first and only appointee to this position was Prof. C. V. Riley, who had at that time become prominent as an entomologist through his writings in the "Prairie Farmer," of Chicago, with which paper he had been for some time connected, and through his editorship, in association with Mr. B. D. Walsh, of the "American Entomologist," of which one volume had then been published. He entered upon his duties April 1, 1868, and published his first annual report in December of that year. From that date there followed annually eight additional reports, the ninth being submitted March 14, 1877, and covering the year 1876.

There is no need of any comment upon these nine Missouri reports before any body of economic or scientific entomologists. They are monuments to the State of Missouri, and more especially to the man who wrote them. They are original, practical, and scientific; they cover a very great range of injurious insects, and practically all the species which were especially injurious during those nine years received full and careful treatment. They may be said to have formed the basis for the new economic entomology of the world, and they include a multitude of observations and intelligent deductions which have influenced scientific thought. The value to the agriculturist, as well as to the

scientific readers, was greatly enhanced by the remarkable series of illustrations which were drawn by the author and engraved upon wood by the most skilful wood engravers of that time. Aside from a few of the illustrations to the Flint edition of Harris, they are the best woodcuts ever made of insects in this country, and as a whole the drawing far excels that of the Harris illustrations in its lifelike accuracy, artistic beauty, and closeness of detail. Prof. Riley abandoned his Missouri work on taking up the directorship of the U. S. Entomological Commission, and in pursuance of a shortsighted policy Missouri has never since had a State entomologist.

OTHER STATES AND THE HATCH STATE AGRICULTURAL EXPERIMENT STATIONS. Massachusetts, New York, Illinois, and Missouri are the only States which may be said to have supported official economic entomologists. There are letters on file in the Division, dated in 1880, from Mr. J. T. Humphreys, who announces himself in his letter head as "Late naturalist and entomologist to the Georgia Department of Agriculture;" but although I have made something of an effort to learn the details of Mr. Humphreys's employment, I have so far been unsuccessful. The State of Pennsylvania has for some years handled its economic entomology by means of an officer who holds an honorary commission from the State Board of Agriculture. This commission was held for some years prior to his death by Dr. S. S. Rathvon. At the present time Dr. Henry Skinner, of Philadelphia, and Dr. R. C. Scheidt, of Lancaster, are entomologists to the State Board.

In the spring of 1888, the State Agricultural Experiment Stations, founded under the Hatch Act, were organized. A number of entomologists were soon appointed and active work began practically in the month of February. This movement, the importance of which to American economic entomology can hardly be overestimated, is too recent to require full treatment here.

The first entomological bulletin published by any of the experiment stations was issued in April, 1888, from the Arkansas station by Mr. S. H. Crossman, and was entitled *The Peach-tree Borer and the Codling Moth*. Bulletins from Hulst, in New Jersey; Morse, in California; Tracy, in Mississippi; Ashmead, in Florida, and Weed, in Ohio, followed in May. Popenoe in Kansas, and Perkins in Vermont, published one each in June, and Fernald, in Massachusetts, and Luger, in Minnesota, one each in July.

Through the kindness of Mr. A. C. True, director of the Office of Experiment Stations of the U. S. Department of Agriculture, I am in possession of a bibliographical list of the entomological publications of the agricultural experiment stations down to the present month. This was drawn up by Mr. F. C. Test, of Mr. True's office, and will be published as an appendix to this address. An analysis of its contents shows that 42 States and Territories have employed persons to do entomological work, and that the number of experiment station workers who have published entomological bulletins or reports reaches 77. Not half of these writers, however, have been officially designated as entomologists to the station. Of those so designated there are 28; 8 have held the title botanist and entomologist; 6, consulting entomologist; 4, assistant entomologist; 4, horticulturist and entomologist; 1, special entomologist; 1, entomologist and physiologist; 2, entomologist and zoologist; 1, entomologist and superintendent of farms; 1, director, entomologist, and botanist; 1, vice-director, horticulturist, entomologist, and mycologist; 1, special agent; 1, apiarist; 2, biologist. The other writers bear titles which indicate that they are not specialists in entomology. They are as follows: Agriculturist, 1; assistant agriculturist, 1; horticulturist and agriculturist, 1; horticulturist, 3; assistant horticulturist, 1; botanist and mycologist, 1; director, 2; botanist, 2; superintendent of grounds, 1; pomologist, 1; specialist, 1; veterinarian, 1; clerk and librarian, 1.

The entomological publications of these experiment stations have numbered 311, of which 88 have been annual reports, 213 bulletins, and 10 leaflets and circulars. In character the bulletins and such reports as have definite titles may be thrown into three categories: 1, those which treat only of insecticides and insecticide machinery, 40; 2, those which contain compiled accounts of insects, with measures for their destruction, 60; 3, those which contain the results of more or less sound original observation, with compiled matter and matter upon remedies 117. There are also two small classes: 1, apiculture, 6; and 2, classificatory, 4.

It would be a matter of very considerable interest if I were able at this time to give a more critical summary of the results achieved by our experiment station workers in entomology. The little analysis which precedes shows a gratifying preponderance of bulletins and reports which contain results of original work; and yet at the same time we must remember that while these papers advance our knowledge of entomological science, the compilations may frequently accomplish greater practical good. This point is illustrated by a statement which I have from Prof. Garman, of the Kentucky station. He says that Bulletin No. 40 of his station, containing condensed accounts of some of the commoner and more injurious insects of the farm and garden, is the one for which there has been the greatest demand. The original edition of 12,000 was soon exhausted, and another lot has since been printed. The bulletin was prepared by request, and naturally is not the sort of work which our station entomologists prefer to do. "Its success," writes Prof. Garman, "has been a lesson to me as to what farmers want and will use."

It occurred to me that it might be valuable to have a statement from each of the experiment station entomologists as to the piece of work he had done which seemed to have accomplished the most practical good, in the light of his own accurate information concerning the farming population of his State. I therefore addressed letters to nearly all of the station workers in entomology, but have received replies from only about half of them, so that a statement of this kind would hardly be justified. It is interesting to note, however, that experiment station workers place in very high esteem the results of their correspondence with farmers and of their lectures before farmers institutes and other bodies. It is in these two ways that the popular sentiment among agriculturists as to the importance of economic entomology is being much more rapidly spread than, perhaps, by the publication of bulletins upon injurious insects.

CANADA.

The Rev. C. J. S. Bethune, for many years one of the most prominent writers on entomology in Canada, and a well-known contributor to the columns of the *Canadian Farmer* on the subject of agricultural entomology, was largely responsible for the organization of the Entomological Society of Ontario, and for the first appropriation of money made to that society with a view to the development of economic entomology among our neighbors across the border. The council of the Agriculture and Arts Association of Ontario in 1869 voted a grant of \$400 to the Entomological Society of Ontario for the year 1870, on condition that the Entomological Society should furnish an annual report, should found a cabinet of insects, useful or prejudicial to agriculture and horticulture, to be placed at the disposal of the council, and that it should also continue to publish the *Canadian Entomologist*. This was the origin of the first annual report of the Ontario society, which was published in 1871 by the Agricultural and Arts Association. This association also gave the society \$100 additional, and the Fruit-Growers' Association of Ontario \$50 additional, to be used for the purpose of illustrating the report. During the session of the Legislature of the Province of Ontario in 1870-71 the Agriculture and Arts Act was passed. By this Act the Entomological Society of Ontario was incorporated, and a grant of \$500 per annum was made to it from the Provincial Treasury. In 1872 the Legislature made an extra grant of \$200 for the purchase of woodcuts, etc., making the total appropriation \$700. In 1873 an extra grant of \$500 was made, and the annual grant for 1874 was increased to \$750. In 1875 the grant was \$750, plus \$100 for illustrations; in 1876 \$750, plus \$500 towards the expense of an exhibit at the Centennial Exhibition at Philadelphia; in 1877, 1878, and 1879 it was \$750 per annum, and in 1880 the grant was increased to \$1,000, at which sum it has continued since that date. The Government also pays the expense of printing the annual report.

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.

In 1884 the Department of Agriculture of Canada established the office of honorary entomologist, and this office was filled by the appointment of Mr. James Fletcher, at that time an employee of the Government Library at Ottawa, and already widely known in entomological circles through his active interest in the Ontario society and his contributions to its publications. On July 1, 1887, Mr. Fletcher was transferred to the staff of the Dominion Experimental Farm at Ottawa as entomologist and botanist. Mr. Fletcher's footing since that date has been practically identical with that of an entomologist to one of our State experiment stations, except that his field is larger. He has published a report yearly in the Annual Report of the Experimental Farms, published as an appendix to the report of the Minister of Agriculture. Mr. Fletcher has shown himself to be a man of extraordinary energy, a most entertaining writer, and a most careful observer, and one who has always kept the practical part of his work foremost in view. He has paid a great deal of attention to a side of his work which is neglected by many of our own official entomologists, namely, personal intercourse with farmers, frequent talks on injurious insects at farmers' institutes, etc., and has in this way built up a very large clientage among the most intelligent agriculturists in the Dominion. In economic entomology Canada at the present day is perhaps in no way behind the United States, and this is largely due to Mr. Fletcher's individual efforts, aided and encouraged as they are by the warm support of the eminent director of the experimental farm system, Mr. William Saunders, himself a pioneer in economic entomology in Canada and the author of one of the most valuable treatises upon the subject that has ever been published in America. Canada has the man and the knowledge, but has been hampered by want of funds. The result is that while she has immediately and intelligently adopted the results of researches made in this country, she has not been able to lead us in original investigation.

EUROPEAN COUNTRIES.

In general it may be said that Europe has not felt the need of entomological investigation from the economic standpoint to anything like the same extent as the United States. A climate much less favorable to the undue multiplication of injurious insects than that of North America, and which, moreover, seems to act as a barrier against the importation of foreign destructive species, the actually smaller number of injurious species and the vastly greater familiarity with all phases of the life-history of these species by all classes of the people, partly resulting from the older civilization, partly from educational methods, and partly from the abundance of elementary and popular literature on questions of this character, the denser population, and the resulting vastly smaller holdings in farms, the necessarily greatly diversified crops, the frequent rotation of crops, together with the clean and close cultivation necessitated by the small size of the holdings, and the cheaper and more abundant labor, have all resulted in a very different state of affairs regarding the damage which may be done by injurious insects. In summarizing these points, the Chief of the Agricultural Section of the Ministry of Agriculture of Prussia, in conversation with the writer last summer, argued that Germany does not need to employ general economic entomologists; that its experiment stations seldom receive applications for advice on entomological topics. Special insects, it is true, occasionally spring into prominence; the Phylloxera is one of these, and in an emergency like the Phylloxera outbreak, the work is handled by special commissions. European nations, therefore, can afford to let the insect problem alone to a much greater extent than the United States, for the reason that it is of infinitely less importance with them than with us. The most simple remedies, such as hand-picking, together with a rigid enforcement of the public regulations regarding hand destruction, usually suffice to keep injurious insects in check. Nevertheless, insect outbreaks do occasionally occur, and there is a certain percentage of loss every year from the work of injurious species. The results obtained in the United States, where the number of native injurious species is much greater than in Europe, and where we have in addition to deal with a host of imported species—in short, where the fighting of insect foes has become an absolute necessity—have, however, acted to a certain degree as incentives, not only to other countries which

labor under the same climatic disadvantages as the United States, but even to a certain degree to European countries, where more thorough investigation of injurious insects by competent persons especially appointed for the purpose is gradually becoming thought worth while.*

GREAT BRITAIN.

There is not and never has been in Great Britain a special government appropriation for work in economic entomology. In 1885 Mr. Charles Whitehead suggested to the Lords of the Committee of Council for Agriculture, that it would be valuable to publish reports upon insects injurious to various farm crops. He prepared, and the council published, a series of four reports upon insects injurious to the hop plant, corn and leguminous plants, to turnips, cabbage and other cultivated cruciferous plants, and to fruit crops. In 1886 Mr. Whitehead was appointed agricultural adviser and prepared a report upon insects and fungi injurious to crops of the farm, orchard and garden for 1887-88, and in 1889 the Board of Agriculture was formed, and Mr. Whitehead was retained as technical adviser, especially with reference to insects and fungi injurious to crops, but also with reference to other agricultural questions. He prepared annual reports on insects and fungi for 1889, 1891 and 1892, and a number of leaflets and special bulletins on insects unusually prevalent from 1889 down to the present time. I learn from Mr. Whitehead, that there is no specific law authorizing this expenditure; that his work has been continuous since 1887, and that he has received an annual sum of £250 only. The more important of the special bulletins and leaflets which have been issued have been: Special Report on an attack of the Diamond-back Moth Caterpillar, 1892; Caterpillars on Fruit Trees; Hessian Fly; Moths on Fruit Trees, 1890; Apple Blossom Weevil, Raspberry Moth and the Mangel Wurzel Fly, 1892; Black Currant Mite, 1893; and the Red Spider and Apple Sucker, 1894.

While Mr. Whitehead has, therefore, been the only governmental worker in agricultural entomology, a very considerable work has been done in a semi-official way by an untiring and public-spirited woman, Miss Eleanor A. Ormerod, who is, or rather was, in her official capacity, honorary consulting entomologist to the Royal Agricultural Society. From 1876 to 1893 Miss Ormerod held this position; conducted the correspondence of the Royal Agricultural Society on the subject of injurious insects, and published at her own expense a series of annual reports, seventeen in number, which have contributed very largely to the diffusion of knowledge concerning injurious insects in Great Britain among the farming classes. She has had a most conservative class of people to deal with, and has encountered many obstacles. She has shown herself ingenious, careful and receptive to a degree, and at the same time possessed of an enthusiasm and an unlimited perseverance which are calculated to overcome all obstacles. She has studied many of the English crop enemies *de novo*; she has popularized the work of other English entomologists, and has made accessible to the agricultural class the work of John Curtis and Prof. Westwood, and has adopted, and strongly advocated the adoption of, measures found to be successful in other countries, particularly in America. The good which Miss Ormerod has accomplished can hardly be estimated at the present time, but she will deserve, at the hands of posterity, canonization as the patron saint of economic entomology in England.

Aside from her annual reports, Miss Ormerod has published a large work entitled, *Manual of Injurious Insects and Methods of Prevention*, and numerous smaller works, treating of the Hessian fly, sugar-cane insects and the injurious insects of South Africa, the last two being devoted to the agricultural interests of the English colonies.

* We regret that our space will not permit us to publish the whole of Mr. Howard's address. We are reluctantly compelled to omit his account of the work in foreign countries.—ED.

Within the year the Royal Agricultural Society has made the office of consulting entomologist, or rather zoologist—for they have broadened the term—a salaried one, and Mr. Cecil Warburton, an able student of zoology, although not known as an entomologist, has been appointed to the position. Mr. Warburton has published one report, which is mainly compiled and devoted to extracts from the correspondence of the society, but it is too early as yet to judge of his capabilities from our standpoint.

Miss Ormerod's legitimate predecessor may be said to have been John Curtis, who, from the beginning of Dr. Lindley's *Gardener's Chronicle* contributed an important series of essays upon injurious insects to its columns, under the *nom de plume* "Ruricola." Mr. Curtis's connection with this famous agricultural journal was of great advantage to him, as it enabled him to secure information and specimens from all parts of the kingdom. He had also accumulated a large amount of information during the twenty years he was engaged in writing his great work upon British entomology. When the Royal Agricultural Society of England was founded, in 1840, the council of the Society invited Mr. Curtis to prepare a series of reports upon the insects affecting various crops cultivated in Great Britain and Ireland, and in the *Journal of the Royal Agricultural Society* for the years 1841 to 1857, he published a series of sixteen such reports. The matter of these reports, and also of his previously published *Gardener's Chronicle* articles, was drawn upon largely for, and in fact forms the major portion of, his standard work upon *Farm Insects*, published by Blackie & Sons, London, Glasgow and Edinburgh, in 1860. Whether Curtis was remunerated for his work for the Royal Agricultural Society or not I am unable at this time to state, although he probably received some compensation. I learn, through the kindness of Miss Ormerod, that, chiefly on account of the value of his writings upon economic entomology, Mr. Curtis was awarded a pension from the civil list, which was augmented about three years before his death, on account of the sad loss of sight which he experienced.

In 1877 a strong effort was made to secure the appointment of a Government entomologist. A conference was held at the Society of Arts, which was largely attended and was presided over by the Duke of Buccleugh, K.G. The most important paper read was by Mr. Andrew Murray, and after a long discussion the conference resolved:

That much of the loss occasioned by insects is preventable and ought to be prevented; that it properly belongs to government to provide the necessary means for protecting cultivators from this loss, as it is only by simultaneous action over considerable districts that it can be effectually done, and government alone possesses or can obtain the requisite means of indorsing such action; that the president and lords of the Council and the Agricultural Societies of the United Kingdom be informed of the opinion of this conference and urged to take the subject at once into their consideration, with a view to providing a remedy.

While we have no doubt that this conference was of sufficient importance and attracted enough attention to induce the president, lords, etc., to take the subject into consideration, no further action resulted.

IRELAND.

Mr. George H. Carpenter was appointed in 1890 consulting entomologist to the Royal Dublin Society, and has submitted four reports, entitled, Report on Economic Entomology for the year 1890, and the same for 1891, 1892 and 1893. Reprints of these reports from the Reports of the Council of the Royal Dublin Society have been distributed. Mr. Carpenter is assistant naturalist in the Science and Art Museum in Dublin, and I am not informed as to whether he receives special compensation for his work as consulting entomologist.

INDIA.

Among the English colonies the government of India stands out very prominently in the support which it has given to economic entomology. A most interesting account of the beginning and growth of this work has been transmitted to me by Mr. E. C. Cotes, from which I take, for the purposes of this paper, the following facts:

The present arrangement was the outgrowth of two reports, one on the wheat and rice weevil and the other on insecticides, which were drawn up unofficially in the early

part of the year 1888 by Mr. Cotes, at the suggestion of the secretary to the government of India, in the Revenue and Agricultural Department. Mr. Cotes was at that time in charge of the entomological collections of the Indian Museum, and the reports were published by the government, with the consent of the trustees of the Museum, as the first two numbers of an official series entitled Notes on Economic Entomology. The title of this serial was subsequently changed to Indian Museum notes, when the trustees of the Museum consented to charge themselves officially with the conduct of the investigation. The work really commenced in March, 1888, when Mr. Cotes was deputed to attend an agricultural conference at Delhi, where the part to be taken in the scheme by the various provincial governments was discussed. As a result of this conference the departments of land records and agriculture, attached to the various provincial governments, undertook to arrange for the submittal of reports and specimens from officials concerned with agriculture in all parts of India. The task of collating the results, and also of carrying on such investigations as could be conducted at headquarters, was intrusted to Mr. Cotes, aided by a staff of six office assistants, whom he was permitted to select. Circular letters were sent out to all parts of the country, and large numbers of reports and specimens soon began to come in. The results were published from time to time and freely circulated among all interested. One of the greatest of the early difficulties was the identification of species, but this was accomplished mainly through correspondence with specialists in different parts of the world. The results of six years of work are, in brief: The ascertaining of the identity of several hundred of the more important injurious species which affect crops in India. The recording of the nature of the damage occasioned by them, and the tracing out of the main facts in the life histories in a large number of cases. Information has been continuously supplied to officials and planters as to the nature of their insect pests and the most promising methods of treatment. Many experiments have been tried with a view to the adaptation of insecticides in use in other parts of the world to the requirements of special crops under cultivation in India. Fourteen numbers of the Indian Museum Notes, comprised in three volumes, have been published, and a number of special reports have also been sent out; one on the locust of northwest India, and one entitled Handbook of the Silk Insects of India. Two preliminary lesson sheets for use in native schools have also been prepared by the office. A thorough investigation of the insects affecting the tea plant is now in progress. The funds appropriated for the support of entomological investigation have varied from year to year; the only special grant for the purpose is one of 5,000 rupees per annum from the government of India. This is paid to the account of the Indian Museum, and forms a part of a general fund which is distributed at the discretion of the trustees, partly for the maintenance of the institution and partly for the support of the work carried on in various departments, one of which includes economic entomology. The work was at first looked upon in many quarters as a matter of comparative insignificance, but Mr. Cotes informs me that its importance is now very generally recognized, and that strong representations are being made in influential quarters, urging the desirability of extending the scope of the work, and making it, like other branches of research, an integral portion of the Agricultural Department of the government. The work which has so far been done by Mr. Cotes and his assistants has been admirable, and we know of no more interesting publication upon entomology than the Indian Museum Notes.

SOUTH AFRICA.

The *Agricultural Journal*, the official organ of the Department of Agriculture of Cape Colony, has been paying a great deal of attention to economic entomology during the last four or five years. The so-called Australian bug (*Icerya purchasi*), the grapevine Phylloxera, and the injurious locusts seemed to have roused the colonists to the necessity for more or less investigation, and the Agricultural Department has taken hold of the matter with some little energy. No distinctively official entomologist, however, was ever appointed. Privately Mr. S. D. Bairstow and one or two other colonists have made certain investigations, and their correspondence with Miss Ormerod, honorary consulting entomologist to the Royal Agricultural Society of Great Britain, resulted in the publication of Miss Ormerod's little book, entitled Notes and Descriptions of a Few Injurious

Farm and Fruit Insects of South Africa, with Descriptions and Identifications of the Insects by Oliver E. Jansen. Prior to the publication of this work Miss Ormerod published a leaflet entitled Observations on the Australian Bug, treating the insect from the South African standpoint. For several years, from 1889 to 1893, Mr. Louis Peringuey, an officer of the South African Museum at Cape Town, was employed as entomological adviser to the Department of Agriculture, and drew £100 per annum for his services. His duties in the Museum, however, did not permit him to devote anything like his entire time to entomological work, and in his advisory functions he chiefly answered questions as to the names of insects and the best remedies for insect pests. Acting upon his advice, the government attempted to stamp out the phylloxera by means of the bisulphide of carbon treatment, but without success, and he resigned his office in 1893. Since that time, and in fact for some time previously, the director of the Botanic Garden at Cape Town, Prof. P. MacOwan, a man of very wide information, although not a trained entomologist, has answered entomological questions for the government. His communications, most of them subsequently published in the *Agricultural Journal*, show him to be a clear-headed, practical man, and it is a pity for the interests of the colony that he is too much interested in his garden and botanical work to take up economic entomology as a study. Mr. MacOwan modestly writes, under date of April 11, 1894 :

Unfortunately, I have been in the habit of reading everything that comes in the way and indexing it, so that really they consult my indexes. It is only thus, in the rough, practical way that a garden director, in a dozen years, gets some acquaintance with injurious and beneficial insects that I have answered questions of economic entomology. I only know what I have seen and fought against in the Botanic Garden, and anybody is welcome to such experience. . . . I only wish we could get some such man as seems to be raised easily in the States to do practical science work in the love of it.

AUSTRALIA.

The Australian colonies of Victoria, New South Wales, Queensland, South Australia and Tasmania have all interested themselves to a very considerable extent in the subject of economic entomology. With an energy and receptivity to new ideas akin to our own, their agricultural societies and departments of agriculture have not been content to allow injurious insects full sway, but all have, in one form or another, made efforts to remedy the damage.

TASMANIA. The earliest attempts were made in Tasmania nearly twenty years ago, when the Codling-Moth Act was introduced in the legislative assembly. The provisions of this Act were quite as wisely drawn as those of any subsequent injurious-insect legislation. It was not until 1891, however, that a definite council of agriculture was established by this colony, and not until 1892 that an official entomologist was appointed. In February, 1892, Rev. Edward H. Thompson, a clergyman of the Church of England and a naturalist of very considerable attainments, who had made himself prominent in this connection by his writings for the local press, was appointed entomologist and pathologist to the Council of Agriculture. Authority for the appointment was given in section 13, clause 1, of the Council of Agriculture Act, and reads as follows :

3. To employ from time to time, with the approval of the governor in council, persons competent to give instructions of a practical character in matters pertaining to agricultural and horticultural science, and to arrange for occasional lectures on subjects of interest to cultivators of the soil.

Mr. Thompson's annual compensation was fixed at £300, which in 1894 was reduced to £270, in pursuance of a policy of general retrenchment. The entomologist has charge of no funds for expenses, and up to the present time has been allowed no assistants. Very considerable interest has been aroused, however, in the subject of economic entomology. Mr. Thompson has lectured upon insect pests throughout the colony, and during 1893 received nearly 1,500 letters of inquiry. A little volume of 100 pages, entitled Handbook to the Insect Pests of the Farm and Orchard; their Life History and Methods of Prevention, Part I., has been published, and will be followed by others in the same line, provided the appropriations continue.

NEW SOUTH WALES In New South Wales there was started in 1890 an important publication under the Bureau of Mines and Agriculture, entitled *The Agricultural Gazette* of New South Wales. To this periodical Mr. A. Silney Olliff, entomologist to the

Australian Museum at Sydney, has contributed many important articles on entomological subjects, which have resulted from his appointment to the charge of the entomological branch of the Department of Mines and Agriculture. Whether Mr. Olliff receives a separate compensation for his work in this direction from the Department, aside from his salary as an officer of the Museum, I have been unable to learn. The prominence given to entomological matters in the *Gazette*, however, is an indication of the live interest taken in the subject. In a series of entomological bulletins, begun in 1892, Mr. Olliff's name appears on the title page as "Government Entomologist, New South Wales." Another able entomologist is employed in the Technological Museum at Sydney, in the person of Mr. W. W. Froggatt, who has, under the "Technical Education Series" of leaflets, published at least one important paper bearing upon economic entomology, which has reference to the damage done to boots and shoes by *Anobium (Sitodrepa) panicum*.

QUEENSLAND. In Queensland there is at the present time no official entomologist, although one of the best bits of printed matter relating to economic entomology which has been issued by any of the Australian colonies emanated from the Queensland Department of Agriculture. In 1889 there was published a report on insects and fungus diseases by Henry Tryon, who held, and probably still holds, the position of assistant curator of the Queensland Museum at Brisbane. This is a thoroughly practical and very able report, covering some 250 pages, and contains a great amount of important information. The report is designated as No. 1 upon this subject, but No. 2 has, unfortunately, not yet been published. The occasional bulletins issued by the Queensland Department of Agriculture, giving an account of the agricultural conferences held in different districts of the colony, show a very live interest in the warfare against insects, and this has been particularly the case since Prof. E. M. Shelton, an Englishman by birth, but since his early boyhood a resident of America, and long engaged in agricultural teaching and experimental work here, was employed by the Queensland government as instructor in agriculture in 1890. The Department has begun the publication of a series of bulletins giving the results of recent experiments made at the American agricultural experiment stations, edited by Prof. Shelton, in which late entomological information is given.

SOUTH AUSTRALIA. The first work on injurious insects in South Australia was done by Mr. Frazer S. Crawford, a practical man of wide reading, who interested himself for some years before his lamented death in the study of insects and fungus pests. He read an important paper, under the title of "Insects and fungus pests," before the first congress of agricultural bureaus of South Australia in March, 1890, illustrating the paper by careful drawings done and engraved by himself. It is likely that, had Mr. Crawford lived, he would have been appointed official entomologist to the colony of South Australia. Since his death, however, a vivid interest in the subject has been kept up, largely through the interest shown in the matter by *Garden and Field*, an important agricultural newspaper published at Adelaide, the editor of which, Mr. W. C. Grasby, has visited this country, and is very appreciative of the work which has been done in the United States. The government viticultural expert, Prof. A. J. Perkins, is also a man of some entomological knowledge, although his researches have mainly been connected with the subject of insects injurious to the vine.

VICTORIA. In August, 1890, a conference was held at Melbourne, Victoria, with representatives from the board of viticulture, the council of agricultural education, the different horticultural societies, and wine and fruit growers' associations, for the purpose of considering means for the suppression of insect pests injurious to vegetation; and partly as a result of this conference and further agitation, Mr. Charles French was, in 1891, appointed entomologist to the government of Victoria, under the Department of Agriculture of the Colony. Mr. French's work is largely included in the two parts of an important handbook of the Destructive Insects of Victoria, the first part published in 1891 and the second in 1893. These reports are written in a popular style, and much attention is given to means of destruction. Their distinguishing feature, however, consists in their illustrations, which are colored, and many of which are very lifelike.

THE BRITISH WEST INDIES.

Injurious insects in the British West Indies have only recently received official or semiofficial attention, with the single exception that in the year 1801 a special commission composed of members of the general assembly of the Bahamas was appointed to investigate the damage done to the cotton crop by the red bug (*Dysdercus*, probably *suturellus*) and the chenille (*Aletia xyliana*). Within the past two or three years, however, several of the islands have taken up the subject, with or without governmental support, and there is now a rapidly increasing spirit of investigation.

JAMAICA. In the appointment of Mr. T. D. A. Cockerell, a well-known entomologist, to the office of curator of the Institute of Jamaica, at Kingston, it was specially desired that the appointee should conduct investigations in economic entomology and answer all correspondence in this direction which might come in from planters. Upon taking charge of his new office, in June, 1891, Mr. Cockerell was immediately struck by the extraordinary abundance of scale insects in Jamaica, and their importance as enemies to many cultivated plants. With his accustomed energy he at once undertook the study of these insects, and has since published many papers about them, which have been contributions to knowledge. He started an interesting series of stylographic notes, mainly about injurious insects, disseminated much information on this subject among the planters, and fostered an interest in the study which it is to be hoped will not die out. He was succeeded in office in June, 1893, by Mr. C. H. Tyler Townsend, formerly an assistant in the Division of Entomology, U. S. Department of Agriculture, and entomologist to the State Agricultural Experiment Station of New Mexico, who, during the short time of his residence in Jamaica, followed in the lines laid down by Mr. Cockerell, and published a number of very interesting notes, both in the journal of the Institute and in the stylographic series of notes, which he continued. Mr. Townsend resigned in May of the present year, and we have not heard that his successor has been appointed.

LEEWARD ISLANDS. Although no officially designated entomologist is employed by the Leeward Islands, Mr. C. A. Barber, superintendent of agricultural for these islands, is a well-informed man, a trained botanist, and fully alive to the importance of entomological work. He has conducted some important investigations on the sugar-cane shot-borer and other sugar-cane insects, which have been published in the *Leeward Islands Gazette*.

TRINIDAD. No official recognition of economic entomology has yet been reached in this island, but a very active organization, known as the Trinidad Field Naturalists' Club, has been established, which is well worth mention in this connection, since its president, Mr. H. Caracciolo, and its secretary, Mr. F. W. Urich, have interested themselves especially in the subject of economic entomology and are laboring to interest the government. His Excellency the Governor occasionally attends the meetings of the club, and by the institution of prizes for essays and by similar means, a widespread interest in economic entomology is being aroused. The appointment of an official entomologist is probably a matter of only a short time. *The Journal of the Field Naturalists' Club* is an interesting periodical, full of entomological information, and is now in its second volume.

NEW ZEALAND.

New Zealanders have for some time been fully alive to the importance of the study of economic entomology. They have passed laws concerning the destruction of the codling moth and have made an effort to establish quarantine regulations against the introduction of infested substances from abroad. No governmental entomologist has been appointed, although the Department of Forestry and Agriculture published, in 1887, a monograph of the Coccidæ, by Mr. W. M. Maskell, registrar of the University of New Zealand, the title page of which reads: "An Account of the Insects Noxious to Agriculture and Plants in New Zealand." A second part of this account was promised in an introductory note, but has not appeared. Mr. Maskell has also written upon injurious insects in some of the New Zealand newspapers. Much credit is due to a corresponding member of this society, Mr. R. Allan Wight, of Auckland, for the public-spirited interest which he has

taken in economic entomology. Nearly every number of the *New Zealand Farmer* for several years has contained lengthy articles from his pen, and he has travelled a great deal for the purpose of lecturing before fruit growers' associations and other farmers' organizations. The editor of the *New Zealand Farmer* has also helped the good work along, and has published editorially a number of articles upon the subject. New Zealanders are agitating the question of the appointment of an official entomologist, but at this date seem to have little hope of immediate success.

IN CONCLUSION.

In concluding a review of this character, an American writer may perhaps be pardoned for an exhibition of national pride. Writing in 1870, Dr. A. S. Packard, in his first annual report upon the Injurious and Beneficial Insects of Massachusetts, compared the attention paid to economic entomology in this country with that which it received or had received up to that time in Europe, very much to our own discredit. In the twenty-four years which have intervened the change has been vast. All of the great advances in our science have come from America, and it may justly be said that, aside from the one department of forestry insects, the whole world looks to America for instruction in economic entomology.

These great advances, we must remember, would not have been possible without legislative encouragement. Activity on the part of workers and appreciation on the part of the people and their representatives have gone hand in hand. At the present time the amount of money expended for work in economic entomology is far greater in this country than in any other. Our regular annual expenditure in the support of entomological offices amounts to about \$100,000, very nearly all of which is appropriated by the General Government, \$29,000 going to the Division of Entomology of the Department of Agriculture and about \$60,000 to experiment-station entomologists. To this amount must be added the large sums expended annually in publishing our reports and bulletins. The sum total thus reached will probably exceed the amount expended in this direction by the entire remainder of the world. Much more is therefore to be expected from American workers than from workers in other countries. The American members of this association must bear this fact in mind, and must realize that with the present rapid increase in interest among other nations nothing but the most energetic and painstaking work will result in the retention by the United States of her present prominent position. In some respects our results, have not been commensurate with our opportunities, but we have certainly justified in vast degree the money expenditure which has enabled us to prosecute our work. Not a year passes in which the sum saved to agricultural and horticulture, as the direct result of our work, does not amount to many times that which the Government appropriates, as has been often shown, and notably by our former president, Mr. James Fletcher, in his most able and interesting address at our Washington meeting in 1891.

In the good which has been accomplished in the way of remedial work against insects, the work of the official economic entomologists greatly exceeds that of all other classes of individuals. They have been investigators and teachers, students and propagandists; they have carried their researches into the fields of botany, bacteriology, chemistry, mechanics, and general zoology. Nearly all of the practical remedies in use to-day have been of their suggestion, and all great advances in recent years have come from their labors. Occasionally a practical agriculturist or horticulturist, unskilled in entomology, has discovered an important remedy, as was the case when Mr. J. S. Woodward sprayed his apple orchard with Paris green for canker-worms and found it to be a remedy for the codling moth; but Mr. Woodward would never have sprayed his trees at all but for the suggestion of Dr. LeBaron several years previously. And then, too, Prof. Cook, making the same discovery independently, was the one who, by his careful experiments, established public confidence in the remedy, and it is to him, more than to any one man, that the country to-day owes the great annual saving from the widespread adoption of this eminently practical remedy.

We have, then, done good work. We have accomplished results which have added greatly to the productive wealth of the world. We have justified our existence as a class. We are now better equipped for the prosecution of our work than ever before, and it may confidently be expected that the results of the closing years of the century will firmly fix the importance of economic entomology, in the minds of all thinking men of all countries.

On motion of Dr. Lintner, the thanks of the society were unanimously extended to the president for the admirable address presented.

A letter from the secretary, Mr. Glette, announced that he would be unable to attend the meeting.

The following active members were elected :

F. C. Test, C. E. Chambliss and H. C. Hubbard, all of the Department of Agriculture, Washington, D. C. ; Victor H. Lowe and F. A. Serrine, of Jamaica, N. Y. ; and F. W. Raine, of Morgantown, W. Va.

The following persons were elected to foreign membership :

Walter W. Froggatt, Technological Museum, Sydney, N. S. W.

Charles Whitehead, Barning House, Maidstone, Kent, England.

Geo. H. Carpenter, Science and Art Museum, Dublin, Ireland.

Dr. Geza Horvath, Ministry of Agriculture, Buda Pesth, Austria.

Prof. A. Targioni-Tozzetti, R. Staz. d. Entom. Agric., Firenze, Italy.

Prof. A. Giard, 14 Rue Stanislas, Paris, France.

M. J. Danysz, Laboratoire de Parasitologie, Bourse de Commerce, Paris, France.

Dr. J. Ritzema Bos, Wageningen, Netherlands.

Mr. Sven Lampa, Entomologist, Dep't. Agric., Stockholm, Sweden.

Dr. N. Cholodkowsky, Institut Forestier, St. Petersburg, Russia.

Dr. K. Lindemann, Landwirtschaftliche Akademie, Moscow, Russia.

Prof. A. Portschniky, Bur. Entom., Ministère de l'Agriculture, St. Petersburg, Russia.

Mr. E. C. Reed, Baños de los Cauquenos, Chile.

Mr. J. B. Smith, New Brunswick, N. J., presented the following paper :

BISULPHIDE OF CARBON AS AN INSECTICIDE.

BY J. B. SMITH, NEW BRUNSWICK, N. J.

Bisulphide of carbon as an insecticide of very limited range has been known for many years ; but for ordinary field crops it has not been in general use. In the 1893 meeting of the Association of Economic Entomologists, Prof. Garman mentioned that he had used it in the garden, covering melon vines with a tub and allowing a quantity of the bisulphide to evaporate, destroying thereby the aphides infesting the vines. This interested me greatly, because the melon louse, (*Aphis cucumeris*, Forbes.) is at times a most destructive pest in parts of New York and New Jersey, and one of the most difficult to deal with, owing to the fact that the leaves are close to the ground and that they curl as soon as seriously affected, making it simply impossible to reach them all, even with an underspray nozzle. A lot of pot-grown plants becoming badly infested with aphides in the botanical laboratory, I made a series of experiments, which were not recorded, but which determined that the liquid evaporated slowly, that it killed plant-lice very readily, and that it killed plants with equal facility if used in any large quantity. The appearance of the lice on cantaloupe and citron melons in New Jersey gave me an opportunity of making experiments, and Mr. Howard G. Taylor, of Riverton, N. J., kindly permitted me to kill as many hills as might be necessary to carry them on. I procured a dozen wooden bowls thirteen inches in diameter and six inches deep, inside measurement, and a series of small, graduated tumblers, in which "1 teaspoonful" and

"1 dram" corresponded. To get at the rate of evaporation I poured 1 dram into a graduate and left it exposed; but placed in a shaded spot. It required fifteen minutes to disappear completely. Eleven badly infested hills were then covered by bowls, the vines being crowded under when necessary, and 1 dram in a graduate was placed under each. At the end of twenty minutes I lifted one bowl, found that less than half the material had evaporated; that all the Coccinellidæ were dead, the small lice dying, and the Diabrotica, ants, and large viviparous aphides were yet all alive. Ten minutes later there was little change. At the end of three-fourths of an hour, though scarcely more than half the liquid was gone, all save a few of the mature, wingless, viviparous females were dead. In one hour there was yet liquid in all the graduates; but all the aphides were dead, or appeared so. To test the matter, all the hills treated were marked to be examined later. Another series of infested hills were selected; but the experiment was varied by using 2 drams of bisulphide in some cases, using a shallow saucer in others, pouring the liquid on the ground in two cases, and covering other hills with large square boxes, some of them anything but tight. All coverings were left on for one hour, undisturbed. Examined first a square box covering a shallow saucer with two drams of bisulphide; found this all evaporated and every aphid killed. The bowls covering the saucers in which 1 dram was used showed like results. Two square boxes which were not tight, covering graduates with 2 drams of liquid, had all insects unaffected and the material scarcely half gone. The two bowls under which the bisulphide was poured on the ground were then lifted and all the aphides were found dead. All the other hills covered by bowls showed all the lice dead and not all the bisulphide evaporated. The hills first treated were again examined and there was no sign of recovered life anywhere visible. Bowls, graduates and bisulphide were left with Mr. Taylor, and all the treated hills were marked for later examination and to note the effects of the chemical. The experiments were made in the middle of a very hot day, the thermometer 93° in the shade, little or no wind blowing, and the sand so hot that it burned through shoe soles and could scarcely be handled more than a few moments at a time. Many of the hills showed the edges of the leaves, when the covers were removed, yellowed and set with numerous droplets of a clear liquid. I feared permanent injury, but instructed Mr. Taylor if he found that the plants died to continue his work before the sun was high or after it was quite low. He wrote me under date of July 19: "The hills you treated when here last started to grow nicely, except the two hills where the carbon was poured on the ground; that killed them. The treated hills showed no lice at last examination." I am quite satisfied, from the experiments above recorded and from others that were not recorded, but were simply made to settle practical questions, that in melon fields at least bisulphide of carbon can be used satisfactorily and effectively. It has the enormous advantage of reaching everything on all parts of the plant, not a specimen escaping. With a stock of from 50 to 100 light covering boxes about 18 inches in diameter, as many shallow dishes, and a bottle of bisulphide the infested hills in a field can be treated in a comparatively short time.

The paper was discussed by various members, Mr. Southwick describing a combination of bisulphide with "Polysolve" which he had used in the form of an emulsion; and Mr. Lintner suggesting the use of cloth coverings in place of the boxes employed by Mr. Smith. Mr. Galloway suggested the use of the protection cloth used by seedsmen, which is treated with oil and is practically air-tight; Mr. Howard referred to the original suggestion by Garman, of the use of a wash-tub, which was thought to be very satisfactory for limited applications; and Mr. Smith and Mr. Saunders suggested the use of paper caps, similar to but smaller than, those used by farmers for the protection of the hay crop. The subject of the relation of parasites to the control of the louse was also discussed, as well as the effect of the bisulphide on the plants themselves, also upon the germination of seeds, when employed for the eradication of grain pests, etc.

AFTERNOON SESSION—AUGUST 14TH, 1894.

The report of the committee appointed last year, on co-operation among station entomologists, was presented by Mr. Smith, in the absence of the chairman. The report covered the matter of concerted work upon the life-history of special insects and their geographical distribution, the selection of certain groups of species to be studied from year to year, co-operation in experimentation with insecticide machinery to avoid duplication, and suggestions in the matter of securing conjoint legislative action among the States. The report was accepted and ordered to be printed, so that opportunity might be afforded members to examine it, in order to be able to take definite action on its adoption at the meeting of 1895.

A letter from Miss Eleanor A. Ormerod was read by the President, in which she expressed her regret at being unable to be present at the meeting.

A paper by Mr. J. M. Aldrich, on spraying without a pump, was read in his absence by Mr. Davis. This paper described a scheme for the mechanical mixture of water and oil by the use of an ordinary Nixon climax nozzle, the combination of water and oil being made in the nozzle itself.

In the next paper Mr. C. L. Marlatt gave a review of a number of experiments conducted during the present year with several standard insecticide mixtures, also a series of experiments testing certain of the more important new insecticides or substances which seem to be of value as insect destroyers recently put before the public. The work was mainly to determine (1) the best methods of treating scale insects, (2) the effect of various mixtures on trees and foliage, in both summer and winter applications, (3) to show the relative merits of the old insecticides compared with some of the newer ones, and (4) the possibility of successfully combining insecticides and fungicides.

The paper was discussed by Messrs. Smith, Galloway and others.

Professor Galloway followed with a paper on various insecticide substances with which he had been experimenting for a number of years past, many of them in lines which had not hitherto been worked to any extent. He discussed particularly the kerosene emulsion made with lime, with resin wash, and the Bordeaux mixture. He also described a new method of making resin wash devised by one of his field agents in Florida, which, briefly, consisted in using purer caustic soda, causing a much more rapid formation of the resin soap. Various other mixtures of possible insecticide value were also suggested. The paper was accompanied by the exhibition of a large series of vials illustrating the various mixtures and combinations described by the author. The communication was generally discussed, and the important point emphasized that none of the emulsions were as perfect or as permanent as the standard milk and soap emulsions in common use, although some of them are possibly of value for immediate application.

In the absence of the author the following paper by Mr. Webster was read by the secretary :

SPRAYING WITH ARSENITES *vs.* BEES.

BY F. M. WEBSTER, WOOSTER, OHIO.

At the Rochester, N. Y., meeting of the association, I gave the results of some experiments looking toward a solution of the problem, "Will spraying fruit trees while in bloom affect the bees which afterwards visit these trees for the purpose of securing either honey or any other substance carried to the hives, and if such be the case, what is the effect upon the inmates of such hives?" The results of my first attempt at settling this question will be found on record in *Insect Life*, vol. v, pp. 121-123, and it will, therefore not be necessary for me to repeat them here. On account of the meteorological conditions under which the experiments were carried on they have never been deemed conclusive in point of definite results, even by myself, and I have only been waiting a favorable season in order to finish the work. This year the time appeared to have arrived in which I might hope to solve the problem.

On May 2nd two apple trees in full bloom—and the blossoms were abundant—were thoroughly sprayed with a mixture of 1 ounce of Paris green to each 12 gallons of water. After the water had evaporated the poison could be clearly observed both on bloom and foliage. The application was made during the forenoon, the day being warm and clear, and during the afternoon quite a number of bees were caught while visiting the bloom and marked with carmine ink. The hives were located but a few yards distant from the trees, and both being situated at a considerable distance from any other trees at that time in bloom. None of these marked bees were afterwards found dead about the hives. During the night following the application there was a rainfall of 0.20 inch. On the following day bees were caught and killed by being dropped into a cyanide bottle where the cyanide was embedded in plaster of Paris, after the usual custom. As soon as the bees were dead they were dissected as follows: The posterior legs with pollen attached were severed from the bodies and placed in a small glass vial and securely corked. The contents of the abdomens, including the honey sacs, were next dissected out and placed in a separate vial, and the same mode of procedure was followed with the whole inside of the thorax, this giving me the entire bee except the head, anterior and middle legs, wings, and chitinous walls of the thorax and abdomen. Besides these a number of the bees were kept intact. The whole series was submitted to the assistant professor of chemistry of the Ohio State University, L. M. Bloomfield, to be tested for arsenic by the Marsh method. Mr. Bloomfield found the weight of material submitted in each case to be as follows: Posterior legs, with pollen attached, 0.3498 gram; contents of abdomens and honey sacs, 0.0990 gram; ditto thorax, 0.0710 gram. After the usual tests to prove the absence of arsenic in the reagents it was found that no arsenic was associated with the posterior legs or the pollen with which they were loaded, none had been left in the thoracic matter, but the material from the abdomens gave unmistakable proof of the presence of arsenic. The entire bodies of a number of the bees, taken at the same time from the same tree, were then washed with diluted ammonia water, three washings failing to give a trace of arsenic, but the bodies, after being thus treated, and being boiled in water slightly acidulated, gave distinct traces of the poison, thus eliminating any possibility of the poison having been introduced into the abdominal matter at the time of dissection and from the exterior. May 15th a crabapple tree (*Crataegus*) was sprayed with a mixture of the same ratio of Paris green as before, but in this case only the contents of the abdomens were retained. This matter, to the weight of 0.1463 gram, treated as in the preceding, gave unmistakable proof of the presence of arsenic.

Just at this stage of my investigations, chance, if such a thing there be, threw in my way still more conclusive proof. A few days prior to my last experiment, probably about May 10th, a small apple orchard on the experiment farm was sprayed with Bordeaux mixture, to which had been added Paris green at the rate of 4 ounces to each 50 gallons of the mixture. The bloom had at this time nearly all fallen from the trees the exceptions being an occasional belated cluster. Three colonies of bees, recently brought on to the premises, were located near by, to all appearances in a perfectly healthy condition. A few days after the application of the poisoned Bordeaux mixture one colony suddenly became extinct and a second greatly reduced in numbers, dead bees being abundant about both hives. From these colonies I was able to secure dead bees, and both honey from uncapped cells and dead brood from the hive that had been so mysteriously depopulated. When tested for arsenic by Mr. Bloomfield, precisely as with the other matter, contents of abdomens of the dead bees to the amount of 0.2334 gram revealed the presence of arsenic; 3.7061 grams of honey gave no trace of poison, while 1.8481 grams dead brood showed it to be present, and the entire bodies of the dead bees, thrice washed in ammonia water, as before explained, gave traces of arsenic. In regard to the honey I can only say that it was from uncapped cells, which might and probably did contain last year's honey that was still being used for a partial food supply by the bees.

Briefly recapitulated, arsenic was found present in the contents of the abdomens of bees frequenting recently sprayed blossoms, and we are at least free to assume that more or less of it was contained in the honey sacs. The dead bees three times washed in ammonia water, the latter not revealing the presence of arsenic externally, when tested

showed its presence internally. Brood from uncapped cells (larvæ) of a colony suddenly dying without other apparent cause gave evidence of having died from the effect of arsenic which could have been introduced only from without.

In summing up the matter, then, I can see no other conclusion that can be drawn from the results of my experiments than that bees are liable to be poisoned by spraying the bloom of fruit trees, the liability increasing in proportion as the weather is favorable for the activity of the bees, and that all bloom must have fallen from the trees before the danger will have ceased.

Finally, I believe we now have the first conclusive proof of the effect on bees by the use of arsenical poisons in the orchard while the trees are in bloom. Heretofore all has been uncertainty, the statements made being based on either pure assumption, or, as in one instance, on the result of penning up bees and feeding them on poisoned sweetened water. It is certainly to the credit of the entomological fraternity of America that among their number but few could be found willing to risk a positive assertion based on such slender and unreliable information, and I feel that I am fully justified in pointing out the fact that in the case of two of our fellow members, Dr. Lintner and Mr. Fletcher, in the face of the legislative bodies of their respective States, both refused to commit themselves to the extent of making positive statements either one way or the other.

Mr. Lintner said that his position hitherto had been that laws ought not to be passed on the subject unless it was amply proved that harm did result to bees; and even in that event, the relative interests of the bee-keepers and fruit-growers should be carefully weighed, since it has been showed by him that many harmful insects also visited the blossoms, and they would stand an equal chance with the bees of being poisoned by the arsenical mixtures.

Mr. Smith said that the bee-keepers would always have an advantage when it came to securing legislative action, because, while they represented a comparatively small number of individuals, they are well organized, and can secure action where the much larger body of fruit-growers would be powerless.

Mr. Southwick read the following paper :

ECONOMIC ENTOMOLOGICAL WORK IN THE PARKS OF NEW YORK CITY.

BY E. B. SOUTHWICK, NEW YORK CITY.

The work of the entomologist of the Department of Public Parks in New York City is the care of trees, shrubs, and plants in an entomological sense, and is under the direction of the Commissioners.

The ground to be covered is about 4,000 acres more or less, but most of the work is confined to the Central and other parks of the city proper. Two men, with the entom-



Fig. 56.—The male moth.

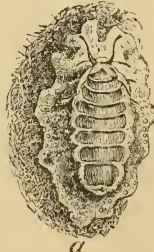


Fig. 57.—(a) The wingless female, (b) a young larva, Fig. 58.—(c) The male chrysalis, (d) the female.

ologist, constitute the working force, save when the *Orgyia* cocoons become very abundant, then laborers assist in their removal.

The work is continued the year round every day save Sundays and an occasional holiday. A one-horse spraying machine carrying $2\frac{1}{2}$ barrels of liquid is used for the or-

dinary work of spraying, and a one-horse machine with a powerful force pump for knocking off plant-lice, cottony scale, etc. Various other tools and appliances are used for the removal of egg masses, webs, bag-worm, cases, larvæ, etc. The poisons used are those that are now quite commonly accepted to be the best, viz., London purple, Paris green, kerosene, crude petroleum, crude carbolic acid, bisulphuret of carbon, hellebore, pyrethrum, and others. The insect that requires the most attention the year round is *Orgyia leucostigma*. Fig. 56, the male moth; fig. 57, (a) the wingless female, (b) a young larva; fig. 58, (c) the male chrysalis, (d) the female. This species is reduced in several ways.

(1) By hand-picking, by which means barrels of the cocoons and egg masses are removed each year. This work is carried on through the entire winter, when all the parks have to be gone over and the trees put in as good condition as possible.

(2) By jarring the larvæ (fig. 59) down with a pole so arranged that a blow from a mallet on a projection placed at the larger end of the pole, will jar down any that may be on the limb.

(3) By poisoning the foliage with London purple, which is quite effective, and used especially on very large trees that cannot be treated otherwise.

(4) By spraying the trunks of large trees that are covered with cocoons with an emulsion of petroleum and carbolic acid. This spray put on with force will penetrate most of the cocoons and destroy the pupæ or larvæ within, and many of the eggs that may have been deposited on the outside. This last method is only resorted to when we are unable to subdue them in other ways. Large quantities of the cocoons of this insect are collected each year and taken to the arsenal, where the parasites when bred are allowed to escape from the windows of the building to continue their work of parasitism.

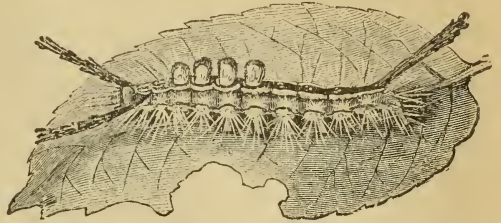


Fig. 59.

The bag-worm, that at one time defoliated whole sections of the park, has been so subdued that it no longer gives us much trouble. Barrels of their cases have been removed from the trees, and each year we remove all that appear in devastating numbers as far as it is possible to do so.

The European leopard moth (*Zeuzera pyrina*) is one of the worst insects we have to contend with. It works in secret, and not until the damage is done can we locate it. Last season we spent two months on this insect alone, collecting and destroying the larvæ and pupæ. All the affected limbs were collected, the insects removed, and then the limbs were taken to the dump and destroyed by fire, in this way making the work complete. A great many wagon-loads were so collected and destroyed, and this work manifested itself this year in the lesser number of trees affected. This year we continued the work of collecting, but were only able to give two weeks to it, but with the aid of the gardeners we were able to destroy a great many. I believe the work we have done with this insect alone, has saved thousands of trees in our parks that would otherwise have been either destroyed or deformed. This question is a serious one when we are considering such valuable representations of our Silva as are collected in our city parks, for when a limb is amputated by this insect the stub is sure to die, and if the fungus does not immediately take possession of it, it will be amputated by a so-called gardener, who does not see the advisability of protecting the scar from fungi and insects; and here is offered a field for the greedy fungi, whose ever-present spores are ready to grow when the proper field offers itself, and they hardly ever fail to take possession, and all over, our fine elms can be seen with groups of *Agaricus ulmarius* in all stages of growth. This close pruning, without proper protection from insects and fungi, is one of the most important questions of our times, for every year great numbers of trees are destroyed for want of proper protection and a knowledge of seasonable pruning.

Right here the sap fly, which I take to be *Mycetobia pallipes*,* finds congenial habitat, and hundreds of trees are weakened by the flow of sap they cause, besides being unsightly from the slimy frass running down their sides. Those we treat with a crude carbolic-acid emulsion sprayed over them; after a time, however, they again show themselves, and have to be treated again:

The elm leaf-beetle is another pest that we have to fight, but with the force of two men, and miles of ground to cover, it is very difficult to keep this insect in subjection. Our success has been in preventive measures rather than otherwise. However, we do successfully destroy them when they have spread over the entire tree. As soon as the first eggs are discovered on the leaves, about the 1st of June, we immediately poison the foliage and keep them from spreading. When the larvæ come down to pupate and collect at the base of the tree, we treat them by spraying with an emulsion of kerosene and crude carbolic acid. In this way we destroy bushels of them, and with the spraying are able to keep them in check in our city parks.

The pine Chermes (*Chermes pinicorticis*) is another insect that is giving us a great deal of trouble, but we can subdue it most effectually with a stiff spray. The tree is then treated with the kerosene emulsion, and also those insects collected or washed down around the base of the tree. This has to be done at least three times a year. For the past seven years I have been using the stiff spray for different work, and it is one of the best means I know of for cleaning maples of *Pulvinaria*. Three years ago *Pulvinaria innumerabilis* was very abundant on a great number of trees in our parks, and I treated them with the hose and emulsion until I had them in fair subjection. The Chermes and *Pulvinaria* were at one time taken off with corn brooms, but the spray is much more effectual, and gets in among the small twigs without breaking them.

Scale insects are treated with washes and taken off with steel brushes, and are also sprayed with an emulsion, which covers the smaller branches. *Eriosoma Rileyi* is common on our young elms, and these are treated with the kerosene and carbolic emulsion.

The larvæ of the larger silk producers are collected and destroyed, as well as the cocoons. *Datanas* are collected by hand, as they are assembled in masses, and destroyed. The web-worm, always abundant in our parks, is collected either by taking down the twigs or, if the tree is a valuable one, by twisting them out and crushing the larvæ.

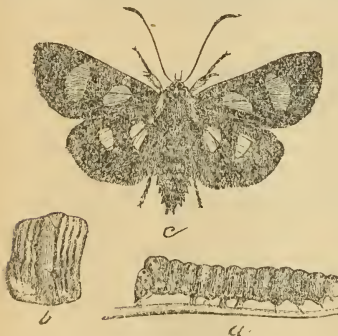


Fig. 60.—(a) The caterpillar, (b) a segment showing markings, (c) the moth.

Alysia octomaculata, fig. 60, (a) the caterpillar, (b) a segment showing markings, (c) the moth, is abundant where *Ampelopsis* is grown. These are effectually destroyed with the London purple solution.

The catalpa trees have been affected by a species of *Cecidomyia*, which causes the ends of the branches to turn black and break off. These are collected every year and destroyed before the larvæ leave the twigs. Leaf-skeletonizers are always abundant on many of our trees, and the *Platanus* and *Liquidambar* species have suffered most. These insects are cut off as soon as they can be seen working and destroyed. If left for any length of time they make the tree very unsightly.

Aphis species are treated with the kerosene emulsion after the colonies have been broken up with the stiff spray. I have found it impossible to get an emulsion to act upon many of the plant-lice on account of the secretion; but let me play the hose on them a short time and they are disintegrated and demoralized, and many are killed outright by the shock; then a fine spray of emulsion will reach them more effectually than otherwise. The more I have occasion to use a force of water the more I see the benefits that will accrue from it, especially in economic entomological work, for larvæ of many kinds can be knocked down by it, and my men have brought me birds that they have knocked out of a tree and captured.

*Mr. A. D. Hopkins says it is probably a species of *Sciara*.—E. B. S.

Other insects that are working on the foliage and in the stems of our plants we have in great numbers, but enough has been said to give an idea of some of the work we try to accomplish. Could we have sufficient force to do the work at the proper time there seems to be no reason why our parks could not be kept in the best condition; but with a force of but two men, with the entomologist, the wonder is that even a respectable showing can be made and the vegetation kept in as good condition as we now find it.

Mr. Howard said that he was very much interested in Mr. Southwick's account of the use of water as an insecticide and referred to some experiments in the same line which he had conducted, in which he showed a strong stream of water to be an effective agent against the rose slug and certain other insects.

Some discussion followed on the nature of the work and the probable species of the sap worm described by Mr. Southwick, which was thought by Mr. Lintner to be probably a species of *Sciara*.

Mr. Southwick followed with a second paper on the Wood Leopard Moth in the parks of New York, giving an historical account of the insect, its present status, the nature of the injury, the plants affected, and the means he had adopted to exterminate the pest. He stated that this is a most difficult insect to control, and could only be reached by cutting off the affected limb. In the case of rare trees, he had adopted the plan of putting a little bisulphide of carbon in the larval burrow with an oil can, closing the entrance with putty, which had proved an effective remedy.

The paper was discussed by Messrs. Smith, Howard and others.

In the absence of Prof. F. H. Snow, of Lawrence, Kansas, his paper was read by Mr. Victor H. Lowe. This communication, entitled "Work in Economic Entomology at the University of Kansas for the season of 1894," related particularly to the successful work with the chinch bug disease (*Sporotrichum globuliferum*), and a new alfalfa and wheat pest, which proved, on rearing, to be *Agrotis introferans*, Grote.

Mr. Smith reported that the same noctuid had been found by Mr. Gillette to occur very abundantly the present year in Colorado, and Mr. Howard referred to the occurrence of the moth in enormous numbers in Nebraska.

Messrs. Ashmead, Lintner and Hopkins were appointed by the President a committee to nominate officers for the ensuing year.

MORNING SESSION—AUGUST 15TH, 1894.

Mr. Hopkins presented notes on some discoveries and observations of the year in West Virginia. The paper dealt chiefly with wood-working insects, but also covered various garden pests, such as the potato-scab gnat, the melon plant-louse, etc. The paper was discussed at some length by Mr. Smith, Dr. Lintner, Mr. Raine, and others.

The President read a letter from Mr. Webster, stating that he was unable to be present on account of being actively engaged in stamping out an attack of *Fidia* larvae on grape roots, by the use of bisulphide of carbon.

Mr. Howard read a paper on the eastern occurrences of the San Jose scale, in which he briefly reviewed the history of the insect in the United States and showed that as a result of investigations during the winter of 1893-4 and the summer of 1894, the scale has been discovered in six localities in the eastern United States outside of New Jersey, while in the latter State it occurs at many points. He traced the introduction to two nursery firms in the state of New Jersey and one in Missouri. He detailed in full the remedial work which has been undertaken by the Division of Entomology of the United States Department of Agriculture in each of the six eastern localities, and showed that by virtue of the active measures which have been taken, the insect will probably be stamped out in the east by the close of the season.

The next paper was on the same subject, and discussion was therefore deferred.

Mr. Smith then read a paper on the San Jose scale in New Jersey. He stated that the scale had first come to him from a nursery in the state in March, 1892, but had not been recognized and he did not become aware of the true nature of the insect until he received the special circular sent out by the United States Department of Agriculture early in 1894. He described his work in connection with the stamping out of the scale, and particularly the active and energetic steps taken by the owners of the infested nurseries, from which the scale had been exterminated on young stock. He reported sending out letters to all persons who had obtained stock from the nurseries in question, enclosing the circular from the Department of Agriculture referred to, and the examination of nearly 100 orchards in person. As a result of his observations and work, he felt confident that the scale would ultimately be completely stamped out. The introduction of the scale was shown to have been either in 1886 or 1887, on some plum stock claimed to be curculio-proof, obtained from the San Jose region in California. Other fruit trees imported from California were also shown to be very likely infested. He gave some facts in regard to the trees and varieties which are most liable to be infested, also some notes on remedies.

In the discussion of these two papers Dr. Lintner considered the possibility of the introduction of the scale on fruit from California and concluded that the likelihood of the scale, so introduced, obtaining a foothold, was very slight.

Mr. Marlatt thought there was danger in placing too much confidence in the work or the statements of nurserymen as to the completeness of the eradication of the scale, pointing out the great difficulty of thorough extermination and the ease with which a random scale here and there could be overlooked. Mr. Banks referred to the publication in a New York paper of occurrences of the scale in two or three localities in New York, accompanied with the report of the adoption of active measures to stamp it out in each instance.

AFTERNOON SESSION—AUGUST 15TH, 1894.

In continuation of the discussion of the morning session, Mr. Smith exhibited specimens of California pears, obtained in Brooklyn which were covered with the San Jose scale in all stages of development.

Mr. Lintner exhibited an apple coming from Ottawa, Canada, handed to him by Mr. Saunders which was covered with the scales of *Mytilaspis pomorum*. (Fig. 51.)

Mr. Davis read a paper on mealy bugs and other lice. He gave a careful resume of the life history of the common mealy bug (*Dactylopius destructor*) with detailed descriptions of the different stages, also some notes on *D. longifilis*. He also described a coccus which he found on roots of clover, giving a general account of the habits and careful descriptions of the species. He also referred to *Eriococcus azalee* and other scale insects.

The paper was discussed by Messrs. Serrine, Ashmead and Howard. Mr. Serrine thought Mr. Davis's clover coccus was the same as the one found by Professor Forbes on white clover, and named by him *Coccus trifolii*, Mr. Ashmead coinciding in this view, and Mr. Howard stating that the *Eriococcus azalee* was certainly not an introduced species from Belgium, as suggested by the author, since the species is not known in Europe, and Professor Comstock has found it on wild plants near Ithaca, indicating that it is undoubtedly a native species. He said also that the two old species of *Dactylopius* referred to by the author had been shown by Berlese to be synonymous with European species, and that their life histories had been worked out by this author in great detail.

Mr. Marlatt read a paper on the Pear-tree Psylla in Maryland, in which he described the sudden occurrence of this northern pear pest in two orchards on the eastern shore of Maryland, in very destructive numbers. The introduction of the species was shown to have been upon nursery stock from infested regions in New York, and the author was confident that the injury, while excessively severe for the moment, would not be of long duration, judging from the past history of the insect. A brief review of the life history was given, with some notes on the natural enemies, notably a species of lace-wing fly,

Chrysopa oculata, the larva of which feeds voraciously on all stages of the *Psylla*; also various species of lady-birds which are useful in a similar way. The life history of the lace-wing fly was carefully worked out. Experiments with various insecticides on the eggs on the *Psylla* were detailed, and general recommendations for remedial work were given.

The paper was discussed by Messrs. Davis, Southwick, Lintner and others, both Messrs. Southwick and Lintner reporting cases of sudden appearance of the *Psylla*, with subsequent equally sudden disappearance.

Mr. Smith deferred speaking until the reading of his own paper which included a reference to the same insect, in which he said that the conditions described by Mr. Marlatt were identical with the conditions obtaining in localities in New Jersey, and that the source of the introduction was also the same.

Mr. Smith then read a paper entitled "Notes of the year in New Jersey," which was a summary of the important insects brought to the attention of the entomologist during the present season. It contained references to occurrences of the Pear-tree *Psylla*, the Pear Blister-mite, the Pear Midge, a new pear pest in a species of *Agrilus*, probably *anxius*, the habits of this last insect being described at some length. The paper also considered the use of protective coverings for the trunks of trees as a means against the borer, invasions of cutworms, the Periodical Cicada, some potato insects, onion maggots, the remarkable mortality of the clover-leaf weevil larvae, and the potato-stalk borer, *Trichobaris trinotatus*, which had been brought to his attention for the first time the present year. The paper was discussed by most of the members present.

Mr. Davis also presented a communication covering notes on special economic insects of the season in Michigan, referring particularly to the occurrence of *Diplotaxis Harperi* as a strawberry pest, a dipteran raspberry girdler, *Adimonia clavicollis* as a cherry tree defoliator, *Notoxus anchora*, as feeding on fruit of cherry.

In the discussion Mr. Hopkins stated that he had found the raspberry cane maggot described by Mr. Davis, in the Alleghany Mountains in 1892, but did not rear the adult.

In the absence of Mr. Chittenden his paper entitled "Supplementary Notes on the Strawberry Weevil, its Habits and Remedies," was read by Mr. Southwick. The writer noted the occurrence of the strawberry Weevil, (*Anthonomus signatus*, Say) in more or less injurious numbers in parts of Maryland, Virginia, Delaware, Pennsylvania, and New Jersey in 1893 and 1894. Three new food plants were discovered, the red-bud (*Cercis Canadensis*), the dewberry and raspberry and the life-cycle from egg to adult was found to extend over a period of four weeks. The methods of oviposition and of severing stems were described. A table showing by States the destructive appearances of the insects from 1871 to date is given. Under the head of remedies, the necessity of clean culture is pointed out, also the benefit that might be derived from early-blooming varieties of staminate, and of the red-bud tree as trap-crop. Kerosene emulsion and Paris green were found by experiment to be of service, but the latter gave the better results. Directions are given for the application of these insecticides, three or four sprayings being advised, beginning two or three days before first bloom. The subject of covering beds is considered, and, in conclusion, the fruit-grower is urged not to trust entirely to staminate varieties.

Mr. Smith said he had anticipated damage from this insect the present season, but so far as he had observed, it did not manifest itself in New Jersey.

In view of the lateness of the hour, the following papers were read by title only :

"Notes on the Insects of Northern Idaho," by J. M. Aldrich, Moscow, Idaho. This paper included a few notes on the principal pests of the "Pan-handle" district of Idaho, where the farming land is at an elevation of 700 to 3,500 feet, with a corresponding change in climate. The insects discussed were the Wheat Aphis, the Codling Moth, Bud Moth, Woolly Aphis, Pear-leaf Blister-mite, and the San José scale, which latter the author stated was the most dreaded insect pest, and a considerable effort was being made to prevent its spread to new localities.

"Insects of the Year," by F. M. Webster, Wooster, Ohio. Mr. Webster's paper had particular reference to the occurrence of the larvæ of *Fidia viticida*, Walsh, in vineyards, which was the important insect manifestation of the year in Ohio. It also covered the raspberry Agrilus, the strawberry Weevil, the pear tree Blister-beetle, joint worms, the Bean Leaf-beetle, and other garden and small fruit pests, such as the Grain Louse, Corn Bill-bug, and a Thrips, which is proving very destructive to onion crops. Other insects were also mentioned briefly.

"Notes from New Mexico," by T. D. A. Cockerell, Las Cruces, N.M. This paper covered numerous short notes on various insects observed in New Mexico, with a description of the climatic and other conditions characteristic of the more important natural districts of the State, and the bearing of these on the insect fauna.

"Some Experience with Mosquitoes," by Howard Evarts Weed, Agricultural College, Miss. This communication covered the result of certain experiments in the use of kerosene as a means of preventing the breeding of mosquitoes in water reservoirs on the college campus. The use of kerosene was very satisfactory, and resulted in a very marked subsidence of the mosquito trouble. The author also reports that kerosene is a very good preventive to apply to the hands or face in the case of mosquito outbreaks.

The report of the committee on nominations was presented by Mr. Lintner as follows:

President—J. B. Smith.

Vice-President—C. H. Fernald.

Secretary—C. L. Marlatt.

The report was unanimously adopted and the officers named duly elected. (By inadvertence no second vice-president was nominated or elected.) It was decided to follow the usual custom for the next meeting, and hold it on the two days preceding the meeting of the American Association for the Advancement of Science, and at the place decided upon for the next meeting of that Association. On motion, it was requested that the minutes be printed in full in "Insect Life."

After the reading and approval of the minutes of the entire session, Mr. Southwick moved that the thanks of the Association be tendered to the President and Secretary for the able and satisfactory manner in which they had discharged their respective duties. The resolution was adopted.

The Association was then declared adjourned by the President for one year.

PROFESSOR C. V. RILEY.

Every entomologist in North America will, we are confident, join with us in the expression of the deepest regret, that Professor C. V. Riley has felt compelled, owing to the impaired state of his health, to resign his position as Entomologist of the United States Department of Agriculture. The admirable work that Dr. Riley and his staff have accomplished, both in scientific and economic entomology, during the many years that he was Director of the Division, is so well and widely known that it is unnecessary to enter into any details here. There are few who possess, in so eminent a degree as Dr. Riley, scientific ability, accurate knowledge, painstaking industry, and acute powers of observation; these gifts and attainments have been abundantly manifested in the immense additions that he has made to the knowledge of insect life in all its various phases, and it would be a calamity indeed if they were withdrawn from active exercise. It is gratifying, then, to know that Dr. Riley will retain the honorary Curatorship of the Department of Insects in the United States National Museum at Washington, and that he will now devote himself to some long contemplated work of a purely scientific character. We earnestly trust that the relief from the cares and anxieties of administrative work in a Government office will speedily restore his health and strength, and that we shall see the fruits of his labors during many a year to come.

While we deplore Dr. Riley's resignation, we cannot refrain from expressing our gratification at the appointment of his successor. The authorities at Washington have shown their wisdom in conferring the vacant office upon Mr. L. O. Howard, who has been so long and so ably sharing in its duties as First Assistant. The Department is certainly to be congratulated upon having at hand a skilled and learned entomologist who possesses in every respect the varied qualifications necessary for the successful performance of so important an office. We have every confidence that the world-wide reputation now possessed by the Division of Entomology at Washington will be in no wise impaired under the administration of Mr. Howard, and we heartily wish him health, strength, and a long life for the successful performance of his arduous and important duties.—*C. J. S. B.*, *Canadian Entomologist*, June, 1894.

BOOK NOTICES.

THE BUTTERFLIES OF NORTH AMERICA: By W. H. Edwards. Third Series. Part XIII.

Another part of Mr. Edwards's magnificent work has been received, and is of particular interest to Canadian students. The three beautiful plates represent the following: Plate I., *Neominois Ridingsii*, Edw. The upper and lower sides of both sexes of the early and late forms are shown, together with the egg and pupa, and a full series of enlarged drawings illustrating the larva in all its stages. This is a Coloradan insect, and flies in the mountains at an elevation of from 5,000 to 8,000 feet. Up to the present there is no recorded instance of *N. Ridingsii* having been taken in Canada.

Plate II. shows *Chionobas Aeno*, Bdl., male and female, and a variety of the male, as well as *Ch. Aeno*, var. *Assimilis*, Butler, and the egg of *Crambis*, Freyer. *Aeno* is an arctic species occurring with the variety in Labrador, and also in Colorado where it inhabits the loftiest mountain peaks. An interesting account of its habits is given from the notes of Mr. David Bruce, who has done a great deal to work up the life-histories of the butterflies of the Coloradan mountains. *Aeno* belongs to the *Semidea* group of the genus, and has been confounded with that species and *Crambis*, Freyer. Mr. Edwards says: "It was not till Mr. Bruce explored the peaks of Colorado that it became possible to understand what *Aeno* was, and the limitation of *Brucei* made clear the position of *Crambis*."

The series is now arranged as follows:

1. CRAMBIS, Freyer.
2. BRUCEI, Edw.
3. AENO, Bdl.
- var. ASSIMILIS, Butler.
4. SEMIDEA.
5. SUBHYALINA.

Ch. Also, Bdl., Mr. Edwards rejects altogether as an American species.

Plate III. shows *Ch. Macounii*, the grand species which was discovered at Nepigon, north of Lake Superior, by Prof. John Macoun, of the Geological Survey, in whose honor it was named. *Ch. Macounii* belongs to a different group of the genus to the species mentioned above, and finds its place with *Californica* and some other large species occurring on the Pacific Coast. It is a fine insect expanding 2-2½ inches and has the remarkable feature of lacking the sexual band of androconia or special scales, which is such a striking characteristic of the males of all the other species in the genus. The plate is a very beautiful one, and shows a pale male and the full life-history with the exception of the pupa. The female figured, although of course copied from an actual specimen, is

hardly typical of that sex, and it is to be hoped that at some future time Mr. Edwards will publish another illustration showing the more usual form, which has a much richer appearance both on the upper and under sides.

Ch. Macounii is decidedly a variable species, both in the intensity of the golden brown of the wings, in the amount of infuscation along the nervures, and in the size and number of the ocelli. Both sexes frequently have three ocelli on the primaries, and occasionally four. One specimen in my collection, plainly a male, has four distinct ocelli on the primaries, the second and fourth from the apex large and pupilled. In fact, this specimen has more nearly the markings of what appears to me the typical form of the females. There is also a very much infuscated variation of the male which is rarely taken, in which the nervures, are all broadly bordered and the greater part of the surface of the disk is covered with dark scales. One of these was mentioned by Mr. Edwards in his original description (*Can. Ent.*, xvii., p. 74), and was omitted from the plate now published for want of space. The life-history of this species has not yet been worked out, as no one has succeeded in obtaining the pupa. It will probably be much like that of *Ch. Chryxus*; but for the present it is unknown, and it remains for some expert and patient breeder to carry the larvæ through all their stages and obtain this missing link. The eggs are easily obtained when a female has been captured; but the breeding is very tedious, the larval life lasting nearly two years.

J. F.

MONOGRAPH OF THE NORTH AMERICAN PROCTOTRYPIDÆ: By William H. Ashmead.
Bulletin of the U. S. National Museum, No. 45; pages 472; plates 18.

Every student of the Hymenoptera must be delighted at the issue of this magnificent volume, which bears most ample testimony to the extensive studies and patient industry of the author. Treating, as he does, of a family in which the American species had previously been but meagrely represented in collections, he has necessarily been compelled to describe a large proportion of the insects now recognized, and to erect a considerable number of genera for their reception. The labor involved in the critical examinations requisite for the determination and description of so many microscopic forms, and in the preparation of the voluminous text, must have been enormous, yet the author has been able to amplify and embellish his work by the delineation of some one hundred and fifty exquisite figures.

The position of the Proctotrypidæ in the order Hymenoptera is considered to be much more closely allied to some families of the Aculeata than to the Chalcididæ, with which they have been usually grouped, while they also approach in other respects the parasitic Cynipidæ. The Mymarinae, hitherto included as a sub-family, are set aside as constituting a distinct family allied to the Chalcididæ, so that the species now contained in the Proctotrypidæ are characterized, and distinguished from the Chalcids, by the pronotum extending back to the tegulæ, and the ovipositor issuing from the tip of the abdomen. Ten sub-families are recognized, which contain about one hundred and thirty genera, represented by nearly six hundred species—a doubling of the genera and quadrupling of the species as enumerated in the catalogue of Hymenoptera issued a few years ago by Mr. Cresson. Many of the genera are known only by single species, but others contain numerous forms, the most extensive being *Polygnotus* (32), *Proctotrypes* (21), *Prosacantha* (27) and *Telenomus* (32). The synoptic tables requisite for the separation of the species in such genera, as well as the tables for the distinction of genera, etc., give evidence of great care and skill in their preparation and arrangement.

While many of the genera are apparently confined to the more southerly and westerly regions, the species in other groups have an extended range, which at times seems to be almost continental, as for instance *Proctotrypes californicus*, which has been taken at Ottawa. The members of this family have received but scanty attention in Canada, so that their distribution northward cannot be stated, but undoubtedly many interesting species could be found by a careful and patient collector in any locality. Provancher, in his *Faune Entomologique*, was able only to announce the occurrence of nine species, and about twice as many are recorded in his *Additions* completed just before

his death. Mr. Ashmead, however, has been able to enlarge the list of Canadian species to about ninety. With the exception of three forms from Vancouver Island, the species are all from a few localities in eastern Ontario and Quebec, so that the Dominion as a whole has been practically unworked. The three western species are *Mesitius vancouverensis* and *Polymecus vancouverensis*, collected by the Rev. G. W. Taylor, of Victoria (and communicated through the writer to Mr. Ashmead), and *Anteon puncticeps*, taken by Mr. Wickham.

Although the Proctotrypids are all small, and frequently microscopic, they show great variations in structure, and their study thus becomes very interesting. A large proportion of them are egg-parasites, while others prey upon Aphididæ, Cecidomyidæ, etc. In many species (noticeably in the sub-family Bethylinæ) the females differ largely from the males in the shape of the head, antennæ and structure generally. Those of the sub-family Dryininæ have remarkable chelate, or pincer-like claws, on the anterior feet, which are probably for more firmly grasping, during oviposition, the small, active homopterous insects on which the larvæ are parasitic. Many forms are wingless or have very rudimentary wings, but they are, nevertheless, very nimble little atoms, and can leap many times their own length.

As the appearance of Mr. Ashmead's splendid monograph may stimulate some of our members to the collection and study of these insects, it may be stated that a considerable number of the species, such as *Bæus*, etc., may be obtained even in winter by sifting moss as it is done for small coleoptera. This habit of hibernating in the moss of swampy localities is another feature (not mentioned by the author) which separates them from the other hymenoptera known to me, with the exception, perhaps, of ants, which are also occasionally obtained in sifting.

W. H. H.

THE BUTTERFLY HUNTERS IN THE CARIBBEES: By Dr. Eugene Murray-Aaron. New York; Charles Scribners' Sons, 1894; pp. 269.

It is a novel event in literature to have a boys' book of adventure written by an entomologist; we were, therefore, prepared to peruse with interest the volume which Dr. Murray-Aaron has just published. Belonging, perhaps, to those whom he characterizes as the "younger old people," we were charmed beyond measure with the book and read it through from beginning to end with as much avidity and enjoyment as any adventure-loving school-boy. It relates, in pleasant easy style, the expedition made by a couple of boys under the guidance of their naturalist friend "the doctor." During the early winter months they visited several of the islands of the Bahamas, and then made a more venturesome excursion across Haiti and into Santo Domingo, winding up with a flying visit to Jamaica. Their object was to collect butterflies especially, and at the same time to gather all the animal and vegetable curiosities that they conveniently could. For an account of their success and the various "dodges" they had recourse to, especially when in pursuit of *Papilio Homærus*, we must refer the reader to the book itself. It is not, however, a mere record of the doings of collectors; a great deal of interesting information is given regarding the condition of the negro races in their barbarism where left to themselves, and their happy condition when under British rule. Much pleasant instruction may also be gained regarding the geography, scenery and government of the various islands that were visited. If any paterfamilias is looking for a book to put in his boy's Christmas stocking, he cannot do better than purchase a copy of this; if his boy has any taste for natural history it will delight him beyond measure. The book is handsomely printed and bound, and illustrated with several well-executed plates. The entomologist may be disappointed at the absence of lists or names of species and pictures of butterflies, but the book is not meant for a scientific treatise, though its statements may be relied upon as strictly accurate, the author being well-known as the editor for a time of *Papilio*, and Curator of the American Entomological Society at Philadelphia, as well as a valued contributor to the *Canadian Entomologist*.

C. J. S. B.

RANDOM RECOLLECTIONS OF WOODLAND, FEN AND HILL; AND WOODSIDE, BURNSIDE, HILLSIDE AND MARSH: By J. W. Tutt, Editor of the *Entomologists' Record and Journal of Variation*. London: Swan, Sonnenschein & Co.

The name of the author of these two volumes must be familiar to our readers as an occasional contributor to our pages, while he is widely known as a writer of much scientific repute on matters concerning the lepidoptera. In these two books he has assumed a lighter and more popular role; his aim has been—to quote his own words—“to bring under the notice of the general public, in readable and untechnical language, a few of the interesting phenomena which are to be observed everywhere around us by those who take the trouble to look for them, and to give such explanations of their causes as may easily be understood even by those whose scientific knowledge is small.” He has certainly carried out his design most successfully and given to the world two very charming and interesting books on out-of-doors natural history. Any one, whether young or old, who takes any pleasure in the beauties of nature and any interest in the varied world of animal and vegetable life, will read them with the greatest delight and follow the author with unflinching interest during his rambles over hill and dale, and by marsh and burn and fen. In the former work more attention is paid to the habits and variations of insects, while the latter treats of any animal or plant that may be met with in expeditions to widely different localities. Amusing episodes and pretty bits of verse enliven the volumes, and many capital pictures render the later one still more attractive.

C. J. S. B.

REPORT OF THE ENTOMOLOGICAL DEPARTMENT OF THE NEW JERSEY AGRICULTURAL COLLEGE EXPERIMENT STATION: By John B. Smith, Sc. D., for the year 1893.

It is obviously impossible to notice all the ever-welcome bulletins and reports that constantly flow from the various experimental stations throughout North America, for copies of which we are very grateful to their authors. We may, however, call attention to Dr. Smith's excellent departure from the ordinary report. After giving the usual general review of the season, and an account of the most important insect attacks of the year, he devotes a large portion of his work to a most useful and admirable account of the “Beneficial Insects” in all the different orders. It is clearly and plainly written, so as to be within the comprehension of non-entomologists, and is profusely illustrated with excellent figures, many of them being new reproductions by means of photography. It ought to be widely distributed, in order to teach the general public that a very large proportion of insects are not noxious, and should not be wantonly destroyed.

C. J. S. B.

REPORT OF THE ENTOMOLOGIST AND BOTANIST (JAMES FLETCHER, F.R.S.C., F.L.S.), Central Experimental Farm, Ottawa, 1894.

Mr. Fletcher's Reports are always interesting and valuable; and the present record of the chief insect attacks of last year, and his observations upon them, is not less so than its predecessors. The season of 1893, as far as destructive insects were concerned, was only remarkable for the superabundance of locusts (grasshoppers), and the consequent damage inflicted upon oats and many other field and garden crops. Other attacks were for the most part of the familiar kinds which we have always with us; these are briefly mentioned in the Report, while more attention is paid to the serious injury caused to grain crops in Manitoba and the North West by cut-worms, the ravages of locusts, granary insects at the Chicago Exhibition, the horn-fly, etc. Very interesting accounts are also given of *Silpha bituberosa*, which attacks vegetables in the North West Territories; and *Polyphylla decemlineata*, which was very injurious to shrubs of various kinds in a nursery at Victoria, B.C.

In the Botanical section of the Report there are two papers especially noteworthy: those, namely, on “Grass for the protection of shores and harbors,” and on the “Tumbleweeds” of the North West. The pamphlet is illustrated by a handsome full page picture of Mr. Fletcher's grass plots at the Experimental Farm, which are full of interest to every visitor; and thirty wood-cuts. It is gratifying to observe how steadily the author's reputation is growing, and how highly his work has come to be appreciated from one end of the Dominion to the other.

C. J. S. B.

EIGHTH REPORT OF THE INJURIOUS AND OTHER INSECTS OF THE STATE OF NEW YORK
FOR THE YEAR 1891 : By J. A. Lintner, Ph. D., State Entomologist, Albany, 1893.

Anything published by Dr. Lintner is sure to contain much valuable information and to be highly interesting, whether the subjects treated of are new to us or not. The Report before us fully supports this statement. It treats of a large number of insects, injurious or otherwise; and gives in most cases a life history of each, including the author's own observations, which are always accurate and clearly detailed. Attention may especially be drawn to the accounts of the Raspberry Geometer (*Synchlora glaucaria*), the Birch-leaf Bucculatrix (*B. Canadensisella*), and the Pear-midge (*Diplosis pyrivora*). An appendix contains some very interesting popular lectures on Economic Entomology, which are well worth perusal. The only drawback to the Report is the late date of its publication, which is more than two years after the observations recorded in it were made.

C. J. S. B.

BUTTERFLIES FROM CHINA, JAPAN AND COREA : By John Henry Leech, B.A., F.L.S., etc.
In parts, 4-to, 642 pp., 43 plates; R. H. Porter, London, Dec., 1892—Jan., 1894.

The fifth and last part of the letter-press of Mr. Leech's work has just been issued, and is accompanied by the statement that five plates of Hesperidæ and a supplemental plate will shortly follow, completing the work. Presumably these plates will be accompanied by the letter-press of the title page, preface and index, with which the work will be ready for the binder. As to the typography of the book, it must be said that it leaves nothing to be desired. The paper is luxuriously heavy; the type is beautifully clear and large; and the text conspicuously free from errors of a minor character, such as occasionally appear even in the most carefully edited works. The scholarship and taste of Mr. Leech and his accomplished secretary, Mr. Richard South, are reflected in the execution of the literary portions of the work. The plates, which are from drawings by William Purkiss, and are executed by chromo-lithography by William Greve, of Berlin, are without doubt the finest examples of this form of work which have as yet graced any similar publication. While a preference is by many accorded to figures lithographed and afterwards colored by hand, and the most exquisitely perfect illustrations have been produced in this way; and while the results of chromo-lithography as ordinarily employed in scientific illustrations have generally been more or less marred by striking crudities, these plates before us are most marvellous illustrations of the capabilities of the chromo-lithographic process, when employed by those who are masters of the art. The plates are almost perfect facsimiles in form and color of Mr. Purkiss's exquisite drawings; and the student of Chinese and Japanese lepidoptera may well rejoice upon having at his command such an infallible guide to specific identity as is found in these beautiful illustrations. The only adverse criticism which the mechanical and typographical execution of the work admits is on the score of the bulk of the letter press, which will necessarily be bound up in one volume. The heavy paper employed results in the production of a book which, as a manual of reference, promises to be somewhat uncomfortably "fat."

The title of the book indicates the consciousness of the author that, in our present state of knowledge, any effort to deal with the lepidopterous fauna of the great regions covered by this work must at best be attended by imperfections. There are wide areas in China in which little or no attempt has yet been made to make collections; and it must necessarily be many years before it can be asserted that our knowledge of the faunistic resources of Central Asia is complete. In his classification, Mr. Leech follows the order now almost universally recognized by writers in England and on the continent as most natural. He erects, as far as the writer has been able to observe, no new genera; and while giving us a large number of new species, appears to have pursued a conservative course in this regard, which is to be commended. To the student of Asiatic lepidoptera the work is simple indispensable, and will remain a lasting monument of the energy and scientific accomplishments of its learned and enthusiastic author. W. J. HOLLAND.

MISCELLANEOUS ENTOMOLOGICAL PAPERS, BY F. M. WEBSTER, FEB. 1894.

We have just received a neat pamphlet of 59 pages, which forms Bulletin 51 of the Ohio Agricultural Experiment Station. It is by Prof. F. M. Webster and like all his work shows careful preparation.

The insects treated of in the first part are: The asparagus beetle, the western corn root worm, the broad striped flea beetle, blister beetles, the basket worm, the cabbage aphid and the apple leaf louse.

An interesting account of the insects which have been introduced into the State is given under the head of "Some insect immigrants in Ohio." There appears to have been two great highways which insects imported from Europe have followed: those which have entered the State at its northeastern corner and spread westward, and those from Southern Europe which have generally entered by way of the Ohio Valley and have a more or less restricted northern distribution.

In the article "Insect foes of American Cereals" the writer is evidently dealing with a subject of which he has made a special study. By patient observation and the application of practical common sense, Prof. Webster has made some important discoveries in Economic Entomology. Not the least of these is the fact recorded in this pamphlet that the apple aphid passes part of the year as an injurious enemy on wheat. In fact Mr. Webster says: "So far as my own observations go, it is more detrimental to the wheat than to the apple." This is an important discovery and will doubtless draw the attention of entomologists to this important subject of the "Alternation of Generations" among the aphides—a line of investigation which has engaged much of the time of Messrs. Riley and Howard at Washington. Speaking of remedies, Prof. Webster says: "It would appear almost visionary to advocate spraying apple orchards with kerosene emulsion in mid-winter to protect the wheat crop, but nevertheless one of the most serious enemies of young fall wheat passes its egg stage on the twigs of the apple during the winter season. I refer to the apple leaf louse, (*Aphis mali*, Fab.)"

"Soon after the young wheat plants appear in the fall the winged viviparous females of this species flock to the fields, and on these give birth to their young, which at once make their way to the roots, where they continue reproduction, sapping the life from young plants . . . though they are seldom killed outright, these infested plants cease to grow, and later take on a sickly look, and not until the aphid abandons them in autumn to return to the apple, do they show any amount of vigor. It is very seldom that the affected plants fully recover, at least in autumn; and the result must be to reduce their productiveness the following year." The eggs of the apple leaf aphid are deposited on the twigs and limbs of apple trees late in the autumn; these do not hatch until the following spring; the plant lice remain on the apple trees for two or three generations, when winged females are produced, which fly to grasses and weeds and there pass the summer. After the young wheat is up in the autumn, the lice congregate on the plants and reproduce rapidly.

The above is briefly the life history of this insect in Ohio as worked out by Prof. Webster by careful experiments which are detailed in the Bulletin. At Ottawa this probably may also, to a large extent, be the case; but the aphid is also sometimes abundant on young apple trees right through the season. It is, however, seldom injuriously abundant in Ontario, although in British Columbia it is to-day one of the most serious enemies of the apple grower.

Prof. Webster's paper will doubtless cause many other entomologists to study this insect more closely, when it is probable that further discoveries will be made, perhaps not less interesting than that now discussed.

J. F.

THE INTER-RELATION OF INSECTS AND FLOWERS.

During the last 8 years there have appeared from the pen of Mr. Charles Robertson, of Carlinville, Ill., several most interesting articles on the inter-relation of insects and flowers. The titles are as follows :

Botanical Gazette—

- 1886. Notes the on pollination of *Asclepias*.
- 1887. Insect relations of certain *Asclepiads*.
- 1887. Fertilization of *Calopogon parviflorus*.
- 1888. Effect of the wind on bees and flowers.
- 1888. Zygomorphy and its causes : I-III.
- 1889-93. Flowers and Insects : I-XI.

Trans. Am. Ent. Soc.—

- 1889. Synopsis of North American species of *Oxybelus*.
- 1891-93. Descriptions of new species of North American Bees.

Trans. St. Louis Acad. of Science—

- 1891-92. Flowers and Insects : *Asclepiadaceæ* to *Scrofulariaceæ*, *Umbelliferæ*, *Labiataæ*.

Mr. Robertson began in 1886 to study the visits of insects to flowers and by his persevering observations he has succeeded in collecting an enormous number of facts which he has published mostly in the *Botanical Gazette* and in the Transactions of the St. Louis Academy of Science.

He has studied the subject especially from a botanical point of view and has given particular attention to the attractions offered to insects by the flowers of different species of plants, to the peculiarities of arrangement of their different parts, to their coloration, and to the modifications which many flowers seem to have undergone from their being constantly frequented by certain species of insects.

Such studies have nevertheless an immediate bearing on entomology, as they give us at the same time an insight into the purposes of insects in visiting flowers, into their habits of feeding and collecting either nectar or pollen, or both at once, and into the intelligence they display in order to attain their end. The close attention thus necessarily given to insects, has had besides the natural result of causing Mr. Robertson to discover that many of those insects which he was observing in his locality, Carlinville, Ill., had not even been described. Therefore, he found it necessary at first to pay particular attention to collecting and determining insects. He was helped in this work by specialists in Diptera and Coleoptera, and had himself to work out and describe many species of Hymenoptera : 10 out of 14 species of *Oxybelus*, 28 out of 30 of *Andrena* and at least thirty other species of *Andrenidæ*. The descriptions of these have appeared in the *Trans. Am. Ent. Soc.*, 1889-1893.

The two great agencies of cross-fertilization of flowers are the wind and insects ; hence Mr. Robertson has thus been led to notice some interesting facts concerning the effect of wind on bees and flowers.—*Bot. Gaz.*, xiii, 1888, p. 33.

The first papers by Mr. Robertson are on the pollination of *Asclepias*, the flowers of which are most interesting in their peculiar adaptation for cross-fertilization by the agency of insects. Their structure and the great difficulty the smaller insects have in effecting pollinations, leads Mr. Robertson to believe, "that bumble-bees have had most influence in modifying the flowers, and they are the most common visitors after the hive bees. Hive bees, it is to be remembered, do not belong to our fauna."

Our space is too limited to allow us to follow the writer into what he has observed in all the different orders and species of flowering plants studied ; but the names of all the insects observed visiting the flowers, are given, as well as tabular data of the respective number of visitors of the different classes, Hymenoptera, Diptera, Lepidoptera,

Coleoptera and Hemiptera. As an instance, it may be mentioned that on the flowers of *Ceanothus Americana* there were seen forty-eight species of Hymenoptera, forty five of Diptera, two of Lepidoptera, thirteen of Coleoptera, and four of Hemiptera; and considerations are given as in the case of all other blossoms treated of, on the arrangement of the flowers, their form, color and other peculiarities of structure, some of them exceedingly minute, in which close and patient observation often succeeds in discovering most wonderful purpose and design for insuring cross-fertilization.

These investigations are of great interest and we commend them to the attention of entomologists and botanists as a fertile field of useful special study. Our idea of mentioning these excellent articles of Mr. Robertson's is to draw to this subject the attention it deserves from entomologists, who from their place of publication might not be aware of their existence.

J. A. GUIGNARD and J. FLETCHER.

A PEN SKETCH OF PROF. WILLIAM SAUNDERS, F.R.S.C., F.L.S., ETC.*

By F. W. GODING, M.D., Ph.D., Rutland, Illinois.

A sketch of the life of Wm. Saunders is peculiarly instructive to young men, because of the fact that he has accomplished so much with so few opportunities in the way of a liberal education, having left school at the age of fourteen; but by painstaking study and observation he has risen to the topmost pinnacle of fame as an entomologist, horticulturist and experimental agriculturist. He was born in Crediton, Devonshire, England, June 16, 1836. At the age of twelve with his parents he removed to Canada, and two years later was apprenticed to a chemist. After learning the art he engaged in business, continuing it in London, Ont., until his recent promotion in 1886 to the Directorship of the Dominion Experimental Farms. As a chemist and pharmacist he is well known throughout the United States and Canada, his published papers being widely copied and translated into several foreign languages. He was President of the American Pharmaceutical Association in 1877-8, while in 1874 he was elected an honorary member of the Pharmaceutical Council of Great Britain. The Canadian Government recognizing his special qualifications appointed him Public Analyst, in which capacity he did good service in detecting and exposing adulterations, especially in articles of food. He was for a number of years, preceeding his recent promotion, Professor of Materia Medica in the Medical Department of Western University in London, Ont., a position he was peculiarly qualified to fill.

Coupled with all these attainments he has others in which we are far more deeply interested. As an entomologist and horticulturist he is known to every student of either branch, and to mention all the things accomplished by him in these departments would require far more space than is allotted to this paper. He began the study of botany some thirty-five years ago, publishing the first list of plants found in Western Ontario, embracing 545 species, in 1863. Some time prior to this he captured a fine specimen of *Papilio turnus* (in 1859 or 60) and found it possessed of so many beauties that he was led to look for others. From this chance occurrence he was directed to the study of insects in general, and as an entomologist is considered second to none in point of eminence. At the time of the organization of this society, in 1863, he took an active part, and much of its present flourishing condition is due to his careful management as President, a position he occupied during the greater part of its existence. While editor of the *Canadian Entomologist*, the only entomological magazine ever published in America that has been able to live to attain its majority, he was also one of its principal contributors, his articles published therein and in your society reports reaching many hundreds. The

*This account of the life of Prof. Saunders, whose portrait is prefixed to this Report, was written two or three years ago, and will be read with interest as conveying the impressions of a foreigner, who cannot be charged with the partiality of intimate friendship.—ED.

crowning work of his pen, however, is his "Fruit Insects," a magnificent volume of 436 pages, which has reached the second edition. The book has been received all over the world as the most valuable work of the kind ever published. One reviewer says of the book :

"We do not think that we are speaking too highly in praise of the work—though we admit it is saying a great deal—when we express our opinion that Mr. Saunders's volume will take rank with that standard of excellence, Harris's injurious insects of Mass., and that he has done for insects affecting fruits at the present day what his justly famed predecessor accomplished long ago for those injurious to vegetation in general."

It appears that the work was just what was wanted from the immense sale of it, about 2,500 copies having been sold. This seems all the more strange when it is stated that the average circulation of entomological works rarely exceeds two or three hundred copies.

Since 1867 he has been a director of the Fruit Growers' Association of Ontario, and its president since 1882. In his experimental grounds he has tested a great variety of fruits, laboring constantly to ascertain which are best adapted to the climate of Canada. In this manner he has, by experiments in cross-fertilization, obtained several good raspberries, gooseberries and grapes. His interest in horticulture and forestry has prompted him to become familiar with these important departments and caused him to awake general interest in these matters in the province in which he lives.

A special commission was appointed by the Government of Ontario, in 1880, to inquire into the progress and condition of agriculture in the Province. As one of the commissioners, Mr. Saunders was charged with the special duty of inquiring into the subjects of fruit growing and forestry, insects and insectivorous birds, and bee-keeping. In his report, published in a large 8vo volume of over 850 pages, he treats each of these subjects as one familiar with them, leaving no topic to be hereafter completed.

As a result of this careful inquiry into the agricultural condition of the Province, the Government caused to be purchased large tracts of land located in the various Provinces, to be known as the Experimental Farms, which were fitted up with all modern appliances and buildings, properly stocked, and then placed Prof. Saunders in charge as Director. Probably nowhere in the Dominion could be found a man so well qualified, by education, tastes and executive ability, as he, to be placed in this responsible position. Already this institution has taken a front rank among similar ones and under Prof. Saunders's charge is destined to become second to none.

Prof. Saunders's services have been recognized in various ways. Some years ago he received from the Duke of Mantua and Montserrat a handsome gold medal in acknowledgment of valuable services in the interests of natural science. He is Fellow of A.A. A.S.; of Linnean Society of London, and of Royal Microscopical Society of London, England; one of the twenty original members of the Royal Society of Canada; Corresponding Member of American Entomological Society; Natural History Society of Montreal; Buffalo Society of Natural Science, etc., etc.

He was married August 1st, 1857, to Sarah Agnes, daughter of Rev. J. H. Robinson, of London, Ontario. They have six children, one daughter and five sons. Several of the latter have inherited the tastes of their honored sire, and are working their way into public favor.

Prof. Saunders is five feet ten inches in height, with a symmetrical figure, and weighs about 175 pounds. His hair is dark brown, his eyes blue. He is one of the most approachable of men, with a look of kindness ever beaming from his genial countenance, yet with a quiet dignity which forbids familiarity.

And now our pleasant task is done. Prof. Saunders at last has found a sphere in which his broadly developed abilities have ample space in which to labor. And here we leave him with the agricultural eyes of Canada ever upon him, awaiting developments that are sure to come and wholly for their interests.

OBITUARY.

THE LATE DR. HAGEN.

Hermann August Hagen was born May 30, 1817, at Königsberg, in Prussia. His parents were Carl Heinrich Hagen, Professor of Political Economy, Technology and Agriculture at the University of Königsberg, and Anna Dorothea Linch. His first instruction was received at the gymnasium "Collegium Friedericianum," whence he was transferred in 1830 to the "Kneiphofische Gymnasium." He graduated in 1836, studied medicine at the University of Königsberg and received the degree of Doctor of Medicine in 1840. After the death of his grandfather, Carl Gottfried Hagen, Professor of Natural History in Königsberg, the latter's entomological collection and library came into the possession of the grandson. Under his father's direction he studied entomology in his leisure time, collecting chiefly Odonata, because by chance the first specimen he caught proved to be an undescribed insect of that order. While he became gradually more interested in this particular study, he had the benefit of some instruction from two eminent and still active naturalists, Theodor von Siebold and Carl Ernst von Baer, who called his attention to the necessity of the study of medicine for the naturalist, the knowledge of pathology being indispensable to a comprehension of any normally constituted organism. He attended also for several years the lectures of Professor Rathke, the celebrated embryologist, and accompanied him in 1839 on his scientific journey through Norway, Sweden and Denmark, studying chiefly the anatomy and habits of marine animals. In 1840, he published at Königsberg, as a dissertation for the degree of Doctor of Medicine, a little work entitled "Synonymia Libellularium Europæorum." From 1840-1 he studied at the University of Berlin and passed, according to the law of Prussia, the necessary examinations as physician and surgeon. He then travelled through the greater part of Europe. In Vienna he attended clinical and medical lectures for six months, and in Paris for nearly a year. The study of natural history was in the meantime always pursued, so far as time and circumstances allowed, and his acquaintance with Baron de Selys-Longchamps, of Liege, made in Paris, 1842, gave rise to a series of entomological publications containing their combined studies of the family of the Odonata. He was favored at this time with the counsel and encouragement of the prominent entomologists, Klug, Erichson, Kollar, Von Siebold, and many others whose personal acquaintance he had made during his travels. He returned to Königsberg in 1843, and settled there as a practising physician. For three years he was first assistant at the surgical hospital, performing the greater part of the operations. In 1851 he was married to Johanna Maria Elise Gerhards. His duties as a physician limiting his studies in natural history to leisure hours, he confined himself to entomology (with especial reference to the Neuroptera), entomological biology, and the study of the microscope. The fear of wasting time in investigating subjects which had already been elucidated induced him to catalogue carefully all accessible entomological publications. This compilation, begun for his own use, was afterwards published as "Bibliotheca Entomologica," in two volumes, Leipzig, 1862. Alone, or jointly with Baron de Selys-Longchamps, he has published in various scientific periodicals a large number of notes, papers and monographs, all of which, up to 1861, are mentioned in his "Bibliotheca." His first publication was made in 1834, on "Prussian Odonata." It was his wish to prepare monographs in all families belonging to the Linnean Neuroptera, but circumstances did not permit the full execution of this plan. In 1849, 1857 and 1861 he made extended scientific journeys through Germany, Belgium, Holland and England for the sake of comparing collections and libraries. From 1863-67, his official duties as Vice-President of the City Council and Member of the School Board of the City of Königsberg left him no leisure. A large number of reports on a great variety of subjects relating to these duties demanded much careful study. Some of them, as for instance one on "Life Insurance," are exceedingly elaborate treatises. In 1863 he received the honorary degree of Doctor of Philosophy from the University of Königsberg.

He was corresponding or honorary member of a large number of learned societies. In 1867 Professor Agassiz invited him to come to Cambridge as assistant in entomology, and in 1870 he was appointed Professor of Entomology in Harvard University.*

"Dr. Hagen entered upon his duties at the Museum with great zeal; and his detailed plan for the arrangement of the collections, though somewhat modified, is, and is likely to remain, the basis for the future. Deeply interested in everything relating to museum work, as his appreciation of series of specimens, his care for their preservation and for the accuracy of their localities, and many minor details, clearly indicate, it is in this collection as well as in his writings that his contributions to science are to be found. Here alone we can fully realize the extent of his discoveries, the keenness of his insight, his skill at preparation and dissection, and with the pencil. His devotion to the Museum knew no bounds; all personal interests were secondary. In 1876 he refused a most flattering and urgent invitation to take charge of the great entomological collections of the *Königliches Museum für Naturkunde* in Berlin, and the time that might have been given to original work was lavished upon the care and arrangement of the collections, which grew rapidly both in size and value. The biological collection, or that illustrating the life history of the species, is a prominent specialty of the Cambridge Museum. In this are preserved specimens showing every condition of an insect's life, the eggs, larvæ in all stages, from those just hatched to those full-grown, their burrows, nests, partially devoured leaves, etc., the work of both larvæ and adults, the frass or excrements often of great importance, pupal stages, adults of both sexes, and the parasitic and predaceous enemies, also in all stages of development. Dr. Hagen's influence upon the formation of such biological collections has been very great; few were in existence at the time when, almost unaided, he created that at Cambridge, and the care and elaborateness with which the whole is labelled makes it not only a worthy model, but most truly a monument to persistent and well-directed industry.

"His lectures, given at rare intervals to advanced students, contained much genuine and exact knowledge, and his many acts of kindness and words of wise counsel will not soon be forgotten by those who enjoyed the facilities of the Department under his charge.

"Most of Dr. Hagen's journeys were undertaken for study among collections and in libraries. In the summer of 1882, however, accepting the generous and thoughtful invitation of Professor Raphael Pumpelly, at that time Director of the Northern Transcontinental Survey, he visited California, Oregon, Washington and Montana. The object of the survey was to collect data concerning insects injurious to vegetation, both of the field and of the forest. The greater part of the time was spent in the Yokima and Columbia regions of Washington; many important entomological discoveries were made, some with a direct economic bearing, and large collections of insects were obtained from a most interesting locality.

"Dr. Hagen was a man of marked character, simple and sympathetic, and if at times somewhat hot and hasty in temper and impatient of opposition, he had also one of the warmest of hearts and most generous of dispositions. His unostentatious hospitality was enjoyed by many entomologists, who found his life in Cambridge quiet, contented and happy.

"Of Dr. Hagen's domestic life it is sufficient to record here that in 1851 he married Johanna Maria Elise Gerhards, who survives him.

"Dr. Hagen received the honorary degree of Doctor of Philosophy from the University of Königsberg in 1863. Harvard made him a Doctor of Science in 1887. The renewal of his medical degree on the 17th of October, 1890, the date of his graduation fifty years previously, after the custom of German Universities, gave him great pleasure. He was elected a fellow of the American Academy of Arts and Sciences, November 11, 1868, and served on the Council in 1877-78. He was also a member of a goodly number of scientific associations and most of the entomological societies the world over were glad to enroll him as an honorary member.

* From "Biographies" following Thomas S. Cary's sketch, "The Museum of Comparative Zoology," in *The Harvard Book*, by F. O. Vaille and H. A. Clark. Cambridge, 1875, Vol. I, p. 345-346, with portrait.

“Stricken with paralysis in September, 1890, Dr. Hagen lingered for more than three years; his painful sufferings being lightened by all that affectionate and devoted care could do. He died at Cambridge, Mass., November 9, 1893, and was buried in the grounds of Harvard University, at Mount Auburn, near his associate, Louis Francois de Pourtalès.” (Samuel Henshaw, in the Proceedings of the American Academy of Arts and Sciences, Vol. xxix., 1894.)

INDEX.

	PAGE.		PAGE.
Adalia bipunctata	53	Flesh-fly	54
Alypia octomaculata	108	Fletcher, J., Articles by, 44, 67, 73, 76, 113, 118, 119	119
Anametis grisea	80	Fletcher, J., Report of	116
Annual Address of President	9	Food, Feeders and Fed	49
" Meeting, Association of Economic		Fungi	56
Entomologists	82	Fyles, Rev. T. W., Articles by	46, 49
" Meeting, Entomological Society of			
Ontario	3	Geddes, G., Article by	25
Anthaxia aeneogaster	47	Geological Section, Report of	20
Antherophagus ochraceus	47	Goding, Dr. F. W., Article by	120
Aphides	53, 60, 102, 108	Gordius varius	52
Aspidiotus perniciosus	73	Guignard, J. A., Article by	119
		Gypsy Moth	67, 84
Barynotus Schoenherri	49		
Bees, spraying with arsenites versus	104	Hagen, the late Dr. H.	122
Bermuda, insects collected in	3, 25	Hair Snakes	52
Bethune, Rev. C. J. S., Articles by, 29, 112, 115, 116		Harrington, W. H., Articles by	9, 47, 114
Bisulphide of carbon as an insecticide	102	Henshaw, S., Article by	122
Book notices	113	Hipparchia, Ridingsii	6
Bordeaux mixture as a deterrent against		Hippodamia 5-signata	47
fla-beetles	66	" 13-punctata	53
Botanical Section, Report of	21	Holland, Rev. W. J., Article by	117
Brachyacantha ursina	47	Howard, L. O., Article by	82
Butterflies, from China, Japan and Corea :		" Appointment of	113
Leech	117	Hydnocera difficilis	47
Butterflies of Eastern Canada	29	Hypomolyx piceus	49
" North America : Edwards	113		
Butterfly Hunters in the Caribbees : Mur-		Injurious fruit-insects of 1894	76
ray-Aaron	115	Internal parasites	54
		Inter-relation of insects and flowers	119
Cacaecia rosaceana	80		
Cannibal insects	56	Jones, L. R., Article by	66
Carpocapsa pomonella	77	Junonia Caenia	3, 25, 31
Catastega aceriella	46		
Chermes pinicorticis	108	Larch saw-fly	4
Chilocorus bivulnerus	59	Librarian, Report of the	7
Chlamys polycocca	48	Limnitis Proserpina	3
Choerocampa tersa	26	Lintner, J. A., Report of	117
Clover-leaf weevil	60	Lyman, H. H., Article by	27
Coccinella, 5-notata	53		
" 9-notata	53	Marlatt, C. L., Article by	82
Codling Moth	76	Meloe niger	48
Colephora Fletcherella	79	Melon louse	102
Coleoptera, Notes on Canadian	47	Moffat, J. A., Articles by	7, 61, 63
Colias eurytheme	4	Montreal Branch, Report of	19
Common names for butterflies	27	Mygale Hentzi	51
Conotrachelus anaglypticus	49	Mytilaspis pinifoliae	59
" nenuphar	77	" pomorum	77, 110
Corphyra Newmani	48		
Council, Report of the	6	Nacerdes melanura	48
Cryptus extrematus	55	Nathalis Iole	6
Cupes concolor	48	Nematus Erichsoni	4
Curator, Report of the	7	Nemeophila petrosa	5
Danais Archippas	3, 25, 30, 65	Obituary	122
Diabrotica longicornis	48	Ocneria dispar	67
		Oestodes tenuicollis	47
Economic Entomological work in New York		Ophion Macrurum	55
park	106	Orygia leucostigma	106
Economic Entomology, rise and present con-		Otioryhncus ovatus	49
dition of	82	" rugifrons	49
Election of Officers	20, 23	" sulcatus	49
Ephestia interpunctella, attack of	57	Oyster-shell bark-louse	77
Euptoieta Claudia	6, 30		
European leopard moth	107	Pamphila metacomet	4
Exyra Rolandiana	4, 44	Papilio Bairdii	4

	PAGE.		PAGE.
Papilio Oregonia.....	4	Saturniadae, structure of undeveloped wing	
Parasitism, Economic value of.....	58	in.....	63
Paria sex-notata.....	81	Saunders, Prof. W., pen sketch of.....	120
Peach bark-beetle.....	80	Scale insects.....	59, 73, 77, 108, 110
Pear-tree flea-louse.....	78	Semasia signatana.....	46
Pelopæus cemetarius.....	51	Smith, J. B., article by.....	102
Phlebotribus liminaris.....	80	" report of.....	116
Phyllodecta vulgatissima.....	48	Snakes.....	49
Phytonomus punctatus.....	60	Southwick, E. B., article by.....	106
Pieris protodice, reappearance of.....	61	Sphæria Robertsiana.....	56
" rape.....	3, 61	Sphinx cingulata.....	26
Pine Chermes.....	108	" luscitiosa.....	3
Pitcher-plant moth.....	44	Spiders.....	51
Plum curculio.....	77	Spotted Paria.....	81
Plusia venusta.....	3	Spraying with arsenites vs. bees.....	104
Pœcilonota cyannipes.....	47	Stevenson, H. A., Article by.....	57
Proctotrypidæ of North America.....	114	Telea Polyphemus.....	63
Psylla pyricola.....	78, 110	Thecla acadica.....	5
Pinus fur.....	51	" liparops.....	5
Pulvinaria innumerabilis.....	59, 108	" strigosa.....	5
Pyralis farinalis.....	5	Thymeticus garita.....	5
Random recollections of Woodland, Fen		Treasurer's Report.....	19
and Hill: Jutt.....	116	Vanessa Antiopa.....	3
Report of Botanical Section.....	21	" Californica.....	6
" Council.....	6	" Milberti.....	3
" Curator.....	7	Webster, F. M., Articles by.....	58, 104
" Delegate to Royal Society.....	22	Wheat Midge.....	59
" Geological Section.....	20	Woodside, Burnside, Hillside and Marsh:	
" Librarian.....	7	Jutt.....	116
" Montreal Branch.....	19	Zeuzera pyrina.....	107
" Treasurer.....	19		
Riley, Dr. C. V., resignation of.....	112		
San José scale.....	73, 109, 110		
Saperda lateralis.....	48		



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