ANNUAL REPORTS

OF THE

FRUIT GROWERS' ASSOCIATION
FRUIT EXPERIMENT STATIONS

AND

ENTOMOLOGICAL SOCIETY
OF ONTARIO

1905

Thirty-Seventh Annual Report

OF THE

Fruit Growers' Association

OF

Ontario,

1905

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

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty.
1906.

WARWICK BRO'S & RUTTER, LIMITED, PRINTERS.
TORONTO.

To the Honourable WILLIAM MORTIMER CLARK, K.C.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Ontario Fruit Growers' Association, for 1905.

Respectfully submitted,

NELSON MONTEITH,

Minister of Agriculture.

TORONTO, 1906.

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Fruit Growers' Association of Ontario.

OFFICERS FOR 1906:

President ..... JAS. S. SCARFF, Woodstock.
Vice-President ..... E. MORRIS, Fonthill.
Secretary-Treasurer ..... P. W. HODGETTS, Parliament Buildings, Toronto.

Directors:

Agricultural Division No. 1 ..... A. D. HARKNESS, Irena.
" " " 2 ..... R. B. WHYTE, Ottawa.
" " " 3 ..... HAROLD JONES, Maitland.
" " " 4 ..... W. H. DEMPSEY, Trenton.
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" " " 8 ..... E. MORRIS, Fonthill.
" " " 9 ..... H. H. GROFF, Simcoe.
" " " 10 ..... A. E. SHERRINGTON, Walkerton.
" " " 11 ..... T. H. RACE, Mitchell.
" " " 12 ..... J. L. HILBORN, Leamington.
" " " 13 ..... G. C. CASTON, Craighurst.

Ontario Agricultural College: Prof. H. L. HUTT, Guelph.
The Association at large: JAS. S. SCARFF, Woodstock; W. H. BUNTING, St. Catharines; ALEX. MCNEILL, Ottawa.
Honorary Directors: THOS. BEALL, Lindsay; A. M. SMITH, St. Catharines; W. T. MACOUN, Ottawa.
Auditor: J. M. DUFF, Guelph.

REPRESENTATIVES TO FAIR BOARDS AND CONVENTIONS.

London: T. H. RACE, Mitchell; JAS. S. SCARFF, Woodstock.
Ottawa: R. B. WHYTE, Ottawa.
Toronto: W. H. BUNTING, St. Catharines; P. W. HODGETTS, Toronto.
Michigan Horticultural Society: T. H. RACE, Mitchell.
Quebec Pomological Society: A. D. HARKNESS, Irena.
Dominion Conference of Fruit Growers: M. PETTIT, W. H. BUNTING, A. W. PEART, ROBT. THOMPSON, ELMER LICK, HAROLD JONES, J. L. HILBORN, D. JOHNSON, A. E. SHERRINGTON.

COMMITTEES:

Executive: President, Vice-President, Secretary, with W. H. BUNTING and HAROLD JONES.
Board of Control, Fruit Experiment Stations: G. C. CREELMAN, Chairman; PROF. H. L. HUTT, P. W. HODGETTS. Elected by the Association: A. M. SMITH, ELMER LICK, W. T. MACOUN.
Transportation: W. H. BUNTING, R. J. GRAHAM, E. D. SMITH, W. L. SMITH, ROBT. THOMPSON, H. W. DAWSON.
Co-operation: A. E. SHERRINGTON, D. JOHNSON, W. D. A. ROSS, ROBT. THOMPSON, ELMER LICK, A. W. PEART.
New Fruits: PROF. H. L. HUTT, W. T. MACOUN and E. MORRIS.
Historical: ALEX. MCNEILL, T. H. RACE, L. WOOLVERTON, H. H. GROFF, W. H. DEMPSEY.
Fruit Show: W. H. BUNTING, T. H. RACE, ELMER LICK, P. W. HODGETTS.

PRESIDENTS OF THE FRUIT GROWERS' ASSOCIATION OF ONTARIO, 1859-1906.

1859-60—Judge Campbell, Niagara.
1861-66—Judge Logie, Hamilton.
1867-69—Wm. H. Mills, Hamilton.
1870-79—Rev. R. Burnett, Hamilton.
1880-82—P. C. Dempsey, Albury.
1883-86—Wm. Saunders, London.
1887-89—A. McD. Allan, Goderich.
1890 —A. M. Smith, St. Catharines.
1891 —J. A. Morton, Wingham.
1892-93—A. H. Pettit, Grimsby.
1894 —T. H. Race, Mitchell.
1895-96—M. Pettit, Winona.
1897-99—W. E. Wellington, Toronto.
1900-01—W. M. Orr, Fruitland.
1902 —G. C. Caston, Craighurst.
1903-04—W. H. Bunting, St. Catharines.
1905 —Alex. McNeill, Ottawa.
1906 —Jas. Scarff, Woodstock.

Fruit Growers' Association of Ontario.

DIRECTORS' MEETING.

The Annual Meeting of the Board of Directors of the Ontario Fruit Growers' Association was held at Albert Hall, Victoria Street, in the City of Toronto, on Tuesday, November 14th at 4 p.m. o'clock.

The following Directors were present: W. H. Bunting, Alex. McNeill, Thos. Beall, J. S. Scarff, A. D. Harkness, Harold Jones, T. H. Race, A. E. Sherrington, J. L. Hilborn, Wm. Rickard, W. H. Dempsey, Elmer Lick, C. W. Vanduzer, H. H. Groff, A. M. Smith, G. C. Caston, W. T. Macoun.

The President, Mr. A. McNeill, occupied the chair.

The minutes of the previous meeting were read and confirmed.

The Secretary presented the following Report from the Executive:—

REPORT OF THE EXECUTIVE, 1904-5.

The year 1905 will be recorded by the fruit growers generally throughout Ontario as one of fair crops and good prices. While some sections have been short in the apple crop, the other fruits, particularly the small fruits, have borne well and brought good returns. The reports of the Directors on the questions sent out by the Executive, would indicate that in the northern and western parts of the Province, the apple crop was poor both in quantity and quality, the scab being very bad especially in unsprayed orchards. In the east, little scab was present, except along the St. Lawrence, where it developed late on such varieties as Fameuse and McIntosh. The codling moth, owing to the short crop, made its presence felt, perhaps more than usual. The labor question still seems a serious one with the fruit grower, and reports from all sections would indicate that the exodus of men to the west and towards the towns and cities has left the farmers more dependent than ever on the inexperienced immigrant and female labor.

Your Executive have endeavored, this past Association year, to put more of the work on the Standing Committees. Owing to lack of funds in previous years, these committees have been unable to get together again after the annual convention, and were so prevented from doing the effective work that might otherwise be accomplished. While a beginning was affected this year, we hope to do even better in the future.

The committee appointed to consider the revision of the constitution, organized at the annual convention in November last, and met at the call of the executive on January 14. A whole day was spent discussing the matter. Owing to the uncertainty relating to the Horticulturist, and also to the Horticultural Societies, nothing definite was settled upon at that time. On October 25th, a portion of the committee met in St. Catharines and outlined the revision which is to be presented to the Association on Wednesday morning. Copies of the proposed constitution have been dis-

tributed to all the members, with the request that the same be carefully looked over previous to the meeting.

The Committee on Co-operation talked over matters after the last days' meeting, and decided upon their line of work for the year. A second meeting of this committee was called in April. A number of points were settled upon, and the committee waited upon the Hon. Mr. Monteith to present to him the claims of the fruit growers. A set of rules and regulations governing local co-operative shipping associations was drawn up by the secretary, and after some changes, approved by the committee. (See Appendix A.) Mr. Putnam, the Superintendent of Institutes, looked after the meetings suggested in the interests of fruit growers, and with the assistance of your secretary, a list of meetings was drawn up, and successfully carried out. Mr. Sherrington also visited a number of scattered places, and did good work in organizing and enthusing the growers. Among the places visited were:

Delegates: A. E. Sherrington, Walkerton; P. J. Carey, Dominion Fruit Inspector, Toronto.

Forest	Jan.	27	Oakville	March	25
Thedford	"	28	Clarkson	"	27
Oshawa	March	6	Islington	"	28
Pickering	"	7	Churchill	"	29
Claremont (aft)	"	8	Collingwood	"	30
Myrtle (eve)	"	8	Thornbury	"	31
Whitby (aft)	"	9	Meaford	April	1
Grange Hill (eve)	"	9	Owen Sound	"	3
Ingersoll	"	22	Allanford	"	4
Norwich	"	23	Simcoe	May	11
Cainsville	"	24	Burford	"	12

Delegates: D. Johnson, Forest; A. Gifford, Meaford.

Tupperville	March	20	Blyth	March	29
Thamesville	"	21	Brussels	"	30
Dutton	"	22	Lucknow	"	31
Sparta	"	23	Walkerton	April	1
Appin	"	24	Paisley	"	3
Ilderton	"	25	Port Elgin	"	4
Parkhill	"	27	St. Mary's	"	5
Goderich	"	28	Simcoe	May	10

Owing to the representations of the Co-operative Committee, two changes were made in the Act relating to Cold Storage Companies, and power sprayers were placed in operation at Meaford and Trenton under the charge of your secretary. Fuller reports of what has been accomplished will be submitted by this Committee in their report to the Association.

The Transportation Committee have also been active during the year. While nothing definite in the way of concessions from the railways have been granted, a much better feeling has arisen between the grower and the carrier. The committee met once in the early spring at the call of Mr. Bunting, and talked over the matter of cars with Mr. Hardwell, the chief traffic officer of the Railway Commission. A second call was issued on October 15th to consider the serious shortage of cars for apple shipments. A strongly worded protest was sent to the Railway Commission at this time. A full report from this committee will be submitted later in our sessions.

It might be well to refer here to the good work accomplished by a number of the members of the St. Catharines Cold Storage Co., who entirely at their own expense undertook this season to forward cars of fruit regularly

to the western markets, with the idea of opening up a profitable outlet for their surplus fruit, and who incidentally have assisted the Transportation Committee in working out some of the problems relating to ventilated and refrigerator cars. A very interesting report on the work will be submitted on Thursday afternoon. Your Executive Committee have met as a body several times during the year, outside of the meetings at the time of our Annual Convention. The Executive met in January to discuss the general plan of work for the year, and to settle, if possible, some of the details in connection with the transfer of *The Canadian Horticulturist*, to the new Company. Two other meetings were necessary before these details were finally settled. Copies of the transfer were drawn up with legal advice, and signed on behalf of both associations. This document in detail will be submitted by the committee to-morrow. A settlement of all outstanding accounts has been made by the payment of a sum of $200 to the Association by the company. A number of other small payments were made in connection with the transfer. Your Association has received $1,000 worth of fully paid up stock in lieu of their good will in the paper, and has further paid $300 as 1st, 2nd and 3rd calls on a second $1,000 of stock as authorized by the Association last November.

The officers of the Hamilton Horticultural Exhibition wrote early in September asking for a grant toward their first district show this year. They were offering quite a large sum in prizes for fruit, and had appointed two representatives of our Association on their Board. Their entries in the fruit section were quite large and distributed well over the surrounding country. After some consideration, a grant of $50 was made on the understanding that hereafter no further financial assistance would be given to such exhibitions.

In connection with the Toronto Exhibition, further changes were made in the prize lists on the suggestion of your committee, largely in the rearrangement of the classes. Collections were grouped together, a list of best varieties of apples placed in a commercial class by itself and cash prizes substituted for medals in the box and barrel sections. In these commercial classes, the results were very gratifying, as shown by the entries. The competition among the growers was keen, and the explanations of its judges and Mr. Boies of British Columbia, who was present, were very instructive.

In connection with the old trouble in regard to the unsuitability of the present building, there seems little hope of improvement for two years at least. The announcement was made after this year's exhibition closed, that the new buildings to be erected for the live stock and other agricultural interests would not be ready till 1907.

Membership.

No question has given the officers of the Association more trouble during the year than that of membership. Up till last November, largely through the *Horticulturist*, the nominal membership in the Association had risen to over 4,000. Of this number, fully 90 per cent. were merely subscribers to the magazine through the Horticultural Societies, or directly through the payment of the price of subscription. They took no apparent interest in the Association itself and were only a source of expense. With the transfer of the magazine to an independent company, and in the reduction in the subscription rates to societies, this inflated membership disappeared, as the societies sent their lists in almost all cases, directly to the business manager of the *Horticulturist*. In response to an appeal from the secretary through

the columns of the magazine, not more than a dozen individual subscribers sent in their names. It is apparent that our future membership must come from among the fruit growers, either amateur or professional, and less from the societies, unless some radical change is to be made in our work. It is undoubtedly true, however, that a few of our Horticultural Societies are composed quite largely of fruit growers, and some effort should be made to look after their interests. We should certainly aim to gather into our Association the members of all co-operative associations, and local or district fruit growers' associations. These should form the backbone of the Association. The question is one for earnest consideration at this annual meeting. Our membership is this year apparently only 359.

Co-operative associations, and local and district fruit growers' associations are now scattered well over the southern, western and northern parts of Ontario and include among others the following active associations:

The Niagara District United Fruit Growers' Association.
The St. Catharines Cold Storage & Forwarding Co.
The Chatham Fruit Growers' Association.
The Forest Fruit Growers & Forwarding Co.
The Fruit Growers' Co., of Oakville.
The Burlington Horticultural Society.
The Bruce Fruit Growers' Association.
The Clarksburg Association.
The Meaford Fruit Growers' Association.
The Port Elgin Fruit Growers' Association.
The Parkhill Shipping Association.
The Thedford Shipping Association.
The East Lambton Fruit Growers' Association of Arkona.

It should be our aim at this convention to so arrange our constitution as to admit of receiving all of these and kindred associations into our membership. They are the men whom we are working for, and we wish for their support.

The programme for this year's convention is largely a business one. Owing to the importance of the work of the special committees, it was felt necessary to give them the opportunity to report in full. Several important matters in connection with the Association are to be brought up for discussion, including the transfer of the *Horticulturist*, the Revision of the Constitution, and the Dominion Conference of Fruit Growers, which is expected to meet in February, 1906. However, in addition to the purely business sessions, your Executive have succeeded in getting Mr. A. N. Brown, of Wyoming, Delaware, to deliver a couple of addresses on topics of live interest to fruit growers. Mr. Brown has wide experience in fruit growing and has already made a name for himself in Ontario through his series of addresses in the Niagara District last spring. Beside Mr. Brown, we expect interesting addresses from Mr. Shutt of the Central Experimental Farm, Ottawa, Mr. Ruddick of the Agricultural Department at Ottawa, Prof. Harcourt, of Guelph, and others. Mr. Thompson, of St. Catharines, has a very important report to bring in on the results of their attempt to open up the Winnipeg market for Ontario fruit.

The Fruit Exhibition.

In the financial statement for the past year, you will find a statement of the show of last November. The show itself, as an exhibition of fruit, was undoubtedly a success, and was a revelation to the people of Toronto

in regard to the quality of apples put up in cases and barrels. The sale of fruit at the close of the show brought fair returns, and about balanced the expenses incurred by the Association for express, freight and cartage. Some opposition was offered this year to the clause referring to prize fruit becoming the property of the Association, and in regard to the Association Exhibits, it was decided to forgo this privilege on the understanding that the exhibitor pay transportation charges and storage.

The buildings used last year were very inconvenient in regard to location, and undoubtedly affected the attendance. The absence of proper heating facilities also was a source of annoyance and heavy loss, especially to the florists. The lighting was better than we are likely to have in Massey Hall. In every other way, the present hall is much better than the Granite Rinks, and the gate receipts should be proportionately greater. Last year, as seen by the financial statement, the running expenses were just about covered by the gate receipts. This year's exhibition, judging by the entries, should make the best show of fruit ever gathered together in Canada. The total entries are about 600, including county exhibits, with 41 barrels, 92 cases, and plates of apples; 29 half cases, 27 plates, and 9 baskets of pears; 66 plates of grapes, 12 cases of grapes, and 123 jars of canned fruit, jam and jelly.

The county exhibits, a new feature worked out entirely by the President, Mr. McNeill, will make quite an addition to an already attractive prize list. While only about half of the counties offering the prizes will be represented, owing partly to the late issue of the lists, and partly to the difficulty of advertising the scheme properly, it is to be hoped that it will lead the way to its repetition on a larger scale another year, should the exhibition be continued. A better selection of varieties for most of the counties could also be made.

The general list differs from last year chiefly in the following classes:—

6. Pyramids of fruit, an entirely new class.
13. Canned fruit, 10 sections added.
14. Jam, a new class.
15. Jelly, a new class.
16. Wine, a new class.

The list itself was later in coming out than in 1904, due entirely to the action of the advertising committee of the Show. The copy for the fruit lists was sent down in time for the issuing of the prize lists at the Toronto Industrial. Delay in securing the advertising was given as the excuse for not getting these lists printed sooner. Your executive will ask for the permission of the Directors to print an entirely separate list next year, should it appear that the general list will not be issued by the 1st of September.

The first meeting of the Show Board was called in April, when the general committee was re-organized, and officers elected. Mr. Score, of Toronto, was re-elected President; Mr. Bunting, Vice-President; Mr. Chambers, of Toronto, 2nd Vice-President; Mr. Dunlop, of Toronto, Treasurer; and Mr. Cowan, General Secretary. A grant of $1,200 from the Department was made for this year, and Mr. Cowan stated that the sum would have to be divided: $600 for Fruit, $200 for Vegetables, $200 for Honey, and $200 for Secretary's expenses. Last year your Association received $600 from this grant, and $50 extra. After some discussion this year it was decided by the Associations represented to pool all grants, donations from private parties, etc., into one fund, to go toward the general expenses of the Show. The question of a suitable building was thoroughly discussed, and Massey Hall was chosen as the best possible place in every way of those available. The

cost, $650 for the week, was very little higher than that incurred last year at the Granite rink, owing to the expense in heating and lighting the latter place.

In arranging the dates of the Show considerable trouble arose owing to the uncertainty of the date to be fixed for Thanksgiving Day. This holiday made a great difference in our receipts last year. As far as the Committee could find out, the holiday was proposed for the same week as last year, but, to our surprise, the 26th of October was finally chosen by the authorities at Ottawa. As this date was too early for the Show, it was decided to choose the week of the 13th of November. It will not be known till the close of this week what effect this will have on the gate receipts as compared to last year.

Since the re-organization, in April, a number of meetings have been held from time to time as matters of importance arose. Each Association, through its representatives, was given four votes on all questions. Mr. Bunting and Mr. McNeill generally arranged to attend these meetings, while your Secretary was present on each occasion. It would seem advisable that a Standing Committee of four members should be appointed, either by the directors or by the Association at large, to look after the interests of the fruit growers in connection with the Show.

The whole matter seems one of considerable interest to our Association. Up till 1904 the annual meeting was the great event in the year, with its programme of interesting addresses, the election of officers, and other matters of importance. A fruit exhibit generally formed part of the programme, but it was of subsidiary interest. No prizes were offered in money, nor were premiums of any kind awarded. Last year the conditions were somewhat reversed, and this year matters seem even worse. The annual meeting, with its programme as an educational feature, would appear to be losing its individuality, and becoming a matter of secondary consideration. The question of the moment is whether such should be permitted. The choice of a meeting-place for the conventions has much to do with the relations between the Show and the programme. For instance, in connection with the Fat Stock Show at Guelph, the hall is within the main exhibition building, the programme is going on all the time, and every stock man present makes an effort to hear some of the addresses that are delivered during the days of the Show. The hall is always crowded, even more so than the aisles between the stock, and great interest is always taken in this, the main feature of the Show.

Here, in Toronto, the professional florists are not interested in the programmes. They at present contribute largely to the exhibition, and have a controlling vote in all questions relating thereto. At the board meetings all matters in regard to programmes are accordingly shelved, and the show of flowers, fruit, vegetables and honey is alone discussed. How this trouble may be avoided, and our programmes brought more to the front, is a question which should be settled at the meeting this year.

Discussion.

The President: The question of the relative importance of the convention meetings and of the exhibition is one that might very well be discussed in connection with this report. The question is whether the Association is losing its old-time importance as an educative factor in connection with fruit-growing.

Mr. Harold Jones: The late Secretary maintained that the educative work which was formerly done by this Association was now being performed by the Farmers' Institute, and the local horticultural societies. I think it is a question whether this is really a fact, and whether these bodies can per-

form the work as effectively as this Association. It is a question whether the Association will not lose its influence by making the Show the leading feature instead of the convention meetings.

Mr. SHERRINGTON: This is a subject which has already been fully discussed. The conclusion was reached that we should have to drop the purely educational features of our annual meeting, as there was too much other business to do. We decided that the work of education could be carried on better outside, through the local horticultural and fruit growers' associations. These associations should be affiliated with the Provincial Association, and this will add to our membership and influence. Since this policy was outlined, my experience leads me to believe that we are progressing in the right direction. At the same time it should not be forgotten that the exhibition is itself of great importance from an educational point of view.

Mr. HAROLD JONES: I think it would be unwise to allow the value of our annual report to run down. The reading public is increasing, and if topics of interest to them are not discussed there, it will be necessary for the executive to secure material from these outside meetings and embody it with the report.

Mr. G. C. CASTON took the view that the discussion of matters relating to practical fruit growing should be continued at the convention.

Mr. W. H. BUNTING: I do not think there is any difference of opinion between the directors as to the value of the Association's exhibition work; but we have come to a critical stage in the history of the Association. Our coming to Toronto, with the possibility of making this a permanent location for our annual meeting was, of course, tentative. We ought now to be able to judge whether that course is likely to prove of greater value than the one formerly pursued. In coming here we have encountered the difficulty that we have not been able to find a location where the Exhibition and the Association meetings could be satisfactorily combined. I fully agree with Mr. Sherrington as to the importance of carrying to the people in the different sections of the Province the information which an Association like this should supply. In accordance with that idea we held last year, in the Niagara district, a series of meetings which lasted for about a week. They were spread over the entire district, and were, perhaps, the most successful series of fruit meetings ever held in this Province. If this plan could be more widely adopted it would do away with the necessity of making this educational work a feature of our Convention. At the same time, I think that some of our meetings ought to be devoted to bringing the masses of our fruit growers together, and placing before them matters of national and provincial importance.

The PRESIDENT: There is no doubt the time has come when this Association should give more attention to the business side of fruit growing than to the educative side, and that we should relegate the elementary work to the local societies; but, at the same time, we must see to it that the educative work is carried on in an effective manner through the local societies, or else we shall be neglecting our duty to the public.

Mr. SHERRINGTON enquired whether subscribers to "The Horticulturist" were members of the Association.

Mr. BUNTING: When *The Horticulturist* was transferred to the company that has taken it over, a little embarrassment arose as to what constituted a member of the Association, and what a subscriber to *The Horticulturist*. In the past it was a case of subscribing to the journal, and becoming a member of the Association by so doing. The consequence was that we had a very extended list of members, many of whom took no interest in the Association's work. What we want is men who become members for the sake of

the Association, and not to make membership one of the advantages incidental to subscribing to the magazine. Our new constitution will, however, solve some of these difficulties.

Mr. Macoun: I think it would be well if something could be done to bring the local directors into closer touch with the fruit growers and flower growers of their respective districts. My view is that all societies receiving Government aid should be required to notify the local directors when they intend to hold meetings, so as to give them an opportunity of being present. This would enable them to keep in touch with their work, and, incidentally, it would give them a better opportunity of ascertaining the facts regarding the local fruit crop on which they are required to report.

Mr. Sherrington: He could not gain this information from the horticultural societies, as they are interested in floriculture almost exclusively. As far as increasing our membership is concerned, I think we must look for it to the local Fruit Growers' Associations, and to them we must look for our information regarding the crop.

Mr. Bunting: I do not think we should deprecate the value of the horticultural societies and their affiliation with this organization. In our town we have a live horticultural society, and our fruit growers take a deep interest in it, although we have several local fruit growers' associations. Harmony and good feeling between the various societies should be maintained by every possible means, as all tend to the advancement of general horticulture.

Mr. Rickard: We formed local fruit growers' associations a few years ago at Orono, Newcastle, and Bowmanville. They made a good start, but, as far as I am aware, they are now defunct. I think it would be desirable for this Association to do something to maintain the interest in these local associations. I agree with Mr. Jones that the educative work of the Association is first in importance. We should aim at educating our fruit growers to produce first-class fruit.

Mr. H. H. Groff: The difficulty seems to be that the men who make a business of fruit growing are numerous only in certain limited portions of the country. If that is admitted, then it is obvious that you must unite with other kindred interests, and form societies more or less sympathetic with all lines of progressive horticulture. The horticultural society of our town, of which I am President, is engaged in all kinds of educational work, but, primarily, in work among the school children. In this we have been most successful, and our exhibition, in which the children receive awards, is the most encouraging side-line of our horticultural work. Our meetings are well attended, and these societies are still in full force in our county.

The President: The remarks that have been made as to the necessity of further educational work are extremely pertinent, and I do not think that, as an Association, we should relegate this entire work to the Farmers' Institutes or the local societies. It might be a good thing if this Association would appoint a committee to co-operate with the Superintendent of Institutes in arranging orchard meetings and fruit meetings generally. I have always found Mr. Putnam exceedingly ready to accept any suggestions that were made.

Mr. Sherrington: I do not think there is any better means of reaching farmers interested in fruit growing than through the Institutes. The Superintendent has been most energetic in advertising these local Fruit Institute meetings. Not only does he give notice through the press, but he sends a circular letter to every Institute member in the district, inviting him to attend. Where no such organization exists, the Department has paid for the advertising.

The President: I entirely agree with what Mr. Sherrington says. My suggestion was merely by way of offering him some assistance from the Association.

Mr. Bunting: As to local associations not being very long lived, I think this may sometimes be attributed to the fact that in the past they do not appear to have had any definite work to perform. In our own section these societies are developing into co-operative associations with definite objects in view. As soon as they take up definite work you will find that there will be no difficulty in this respect. So far as the educational work is concerned, I would again refer to the series of meetings we held last spring. There is no reason why a similar series should not be conducted every year in each of the thirteen districts.

Mr. G. C. Caston: In regard to county prizes, I think that this idea is a good one, and should be written up by the local press, and interest developed in that way. Then some plan should be formulated as to how the prizes are to be awarded.

Mr. Harold Jones: I met with some difficulty at first in interesting our council in the matter, as none of them were fruit growers. I had to make my representations somewhat forcibly, and I think what took their fancy was that Leeds and Grenville would be represented here in Toronto. As soon as I succeeded in securing a grant, I called for the assistance of a committee from the council, and we wrote up a prize list to suit the conditions of the county in which the fruit is grown. I promised the council that if the prize money granted was not awarded, they would get it back. I took that responsibility upon myself, and, if this Association does not support me, I will pay it out of my own pocket. I wanted them to understand that it was purely an educational feature, and an attempt to create a greater interest in fruit growing in the locality. If I am able to go back and report that the prizes have been widely distributed over the country, as I have every reason to believe will be the case, I have no doubt that next year they will be willing to give a still larger grant. Next year I propose to have the prize list ready about the first of September, and to give each member of the council half a dozen copies to distribute to the men who grow fruit in their neighborhoods. The responsibility for securing the grant rests mainly with the local director. He should gather together as many members of the council as possible and clearly explain the intention of the grant to them. We have to formulate the plans, and, if they are presented properly, the councils will, in the majority of cases, fall in with them.

The President: The idea of county prizes is, to my mind, a good one, but, in working out the plan, we fell somewhat short of what might have been done. The fact is it had to be attended to at a time when business was very pressing, so that it was impossible to give as much attention to outside work of this kind as was desired. I am rather surprised to find that it turned out as well as it did. I think next year will show an improvement, and that it will be worked out to much better advantage.

It was then moved by Mr. T. H. Race, seconded by Mr. Beall, and carried, that the report be received and laid upon the table for further consideration.

TREASURER'S REPORT, 1904-5.

Receipts.		*Expenditure.*	
Balance on hand, Nov. 12, 1904	$853 59	Horticulturist	$1,208 19
Fees	174 55	Annual Meeting	313 87
Horticulturist	204 00	Committees	54 00
Binding	40	Salaries	533 32
Annual Meeting	2 00	Show	916 70
Government Grant	1,800 00	Audit	9 50
Show	1,051 05	Exchange	30
Sundries	50 08	Incidentals	63 03
		Binding	57 69
		Stationery	29 75
		Postage	25 00
		Balance on hand, Oct. 31, 1905	924 32
	$4,135 67		$4,135 67

Details of Expenditure.

Canadian Horticulturist:
Balance in hand of Business Manager, $165.99; Subscriptions for members of Association, $145.20; Spectator Co., $697.00; Horticulturist Pub. Co. (payment on stock), $200.00 ..... $1,208 19

Salaries:
H. B. Cowan, $83.32; C. B. Morse, $250.00; P. W. Hodgetts, $200.00 ..... 533 32

Committees:
Transportation (services of lawyer before Railway Commission), $20.00; W. L. Smith, $4.00; J. L. Hilborn (attending Michigan Society meeting), $14.65; Jas. Scarff, $7.85; R. J. Graham, $7.50 ..... 54 00

Annual Meeting:
G. H. Powell, $43.25; J. W. Nimmo (reporting), $5.00; R. B. Whyte, $21.95; G. C. Caston, $7.40; A. M. Smith, $6.00; E. Lick, $4.75; A. D. Harkness, $22.40; J. L. Hilborn, $18.05; Harold Jones, $8.20; Thos. Beall, $11.75; A. K. Goodman, $9.10; Murray Pettit, $6.00; W. H. Dempsey, $7.15; A. E. Sherrington, $15.62; W. H. Bunting, $18.15; Jas. Scarff, $14.10; W. B. Varley (reporting), $95.00 ..... $313 87

Show:
P. W. Hodgetts: (Cartage, $6.00; express, $9.19; tools, $1.35; car fare, $2.50; pins, 90c.; freight, $16.04; express, $58.86; sundries, $5.16; total, $100.00; T. Eaton Co., decoration, $25.00; Model Cartage Co., $1.90; Treasurer, Fruit, Flower and Honey Show, $100.00; R. W. Starr (Judge's expenses), $92.70; Miss A. M. Fox (office expenses), $10.00; Dennison & Co., pins, $1.49; Ray & Hatfield, fruit, $3.50; Bryant Press, $17.00; Douglas & Ratcliffe, paper, $6.00; Toronto Cold Storage, $51.31; W. H. Bunting, travelling expenses, $24.45; W. H. Bunting, fruit, $21.75; prize money, $461.60 ..... $916 70

Audit:
J. M. Duff 9 50

Exchange:
Canadian Bank of Commerce 30

Incidentals:
Hamilton Horticultural Society Exhibition, $50.00; Telegrams, 88c.; Jas. Dorman (office work), $5.00; S. P. Morse (back numbers of Horticulturist), $7.15 ..... 63 03

Binding:
Brown Bros. 57 69

Stationery:
Bryant Press (letter heads and envelopes) 29 75

Postage:
Mrs. Hubertus 25 00

FINANCIAL STATEMENT OF THE FRUIT, FLOWER AND HONEY SHOW, 1904.

Receipts.		*Expenditure.*	
Coupon tickets	$261 90	Commission on tickets	$13 20
Members' tickets	59 00	" " ads	30 50
Gate receipts	871 45	Heating and lighting	188 80
Ads. in prize list	171 00	Labor	271 62
Sale of lumber	19 75	Music	188 00
Grants from associations	200 00	Printing and advertising	542 60
		Lumber	49 24
		Rent of rinks	100 00
		Incidentals	112 70
		Balance	86 44
	$1,583 10		$1,583 10

Balance of $86.44 was handed to Treasurer of the Floral Section to go toward payment of their prize list.

P. W. HODGETTS,
General Treasurer.

On the motion of Mr. Caston, seconded by Mr. Dempsey, the Report was adopted.

PURCHASE AGREEMENT.

The Secretary read the agreement regarding the purchase of *The Canadian Horticulturist*, as follows:

Memorandum of agreement made this first day of April, A.D. 1905. Between Ontario Fruit Growers' Association, hereinafter called "The Association," of the first part, and *The Horticultural Publishing Company, (Limited)*, hereinafter called "The Company," of the second part.

Whereas the Association are the publishers and proprietors of the publication known as *The Canadian Horticulturist.*

And whereas the company are a corporation incorporated by Letters Patent under the Ontario Companies Act, and one of the objects which the incorporators had in view at the time of the incorporation of the said company, was the acquiring of the said Canadian Horticulturist.

And whereas the Association agreed to sell and transfer the said publication to the said company, but the said agreement had not been reduced in writing.

Now therefore this memorandum of agreement witnesseth that the Association agrees to sell and the company agrees to buy the said publication known as *The Canadian Horticulturist'* together with all rights incident thereto and to the publication thereof, and all copyrights used or enjoyed in connection therewith or with the publication thereof, and all the good-will attaching to the said publication, all subscriptions therewith, and all other appurtenances thereof, including one complete file of the magazine since the first date of publication, but not including all extra numbers of *The Canadian Horticulturist* issued previous to December, 1904; and all other documents not herein mentioned at and for the price or sum of one thousand dollars; and the said Association agrees to accept in full payment of the said sum twenty shares of the capital stock of the said company, of the par value of one thousand dollars.

The said Company agrees to allot to the said Association, the said twenty shares of its capital stock of the par value of one thousand dollars.

The said Company further agrees with said Association that the said stock so to be allotted to the said Association while it remains the ownership of the said stock to be represented on the Board of Directors of the said Company by one Director.

The said Association in consideration of the premises and of the said stock hereby covenants and agrees with the said Company that it will not directly or indirectly engage in the publication or distribution within Ontario, of any newspaper, magazine, or periodical or any paper or publication of a like nature, with *The Canadian Horticulturist*, or one likely to compete with the said *The Canadian Horticulturist*, for a period of twenty years.

The said Association retains the right to issue to its members, fruit crop reports, statistics, price lists, and market reports.

The said Association also agrees, for the consideration aforesaid, to assign and transfer to the said Company, any and all the copyrights and other rights and appurtenances belonging to or used or enjoyed in connection with the publication of the said *The Canadian Horticulturist*, and that it will hand over to the said Company, a full list of all subscribers to the said *The Canadian Horticulturist*, and that it will sign, execute, and deliver to the said Company, such further assignments, documents, and assurances as may be necessary to transfer to the said Company, the before mentioned property and rights and subscription lists, advertising, and other contracts.

It is understood and agreed by and between the said Association and the said Company, that the transfer of the said publication shall take place as of the first day of December, 1904, and the expenses and receipts shall be adjusted between the parties as of that date.

Signed,

A. McNeill,
President, Fruit Growers' Association.
P. W. Hodgetts,
Sec.-Treas., Fruit Growers' Association.
Wm. H. Bunting, President,
The Horticultural Publishing Co., Limited.
H. B. Cowan, Sec.-Treas.,
The Horticultural Publishing Co., Limited.

Mr. Race enquired as to what relationship now existed between the Association and *The Horticulturist*?

The President explained that the Association held shares in the Company controlling *The Horticulturist*, to the amount of $2,000, and that it nominates one director to the Board, in which capacity he had been acting until some one could be appointed by the Association.

In reply to an enquiry from Mr. Bunting as to the opinion of the members regarding the present standing of the magazine, Mr. Caston said that it had improved very much. In this view Mr. Groff concurred, and stated that Canadians interested in horticulture could now be reached through its columns, whereas formerly it was necessary to use journals published in the United States for this purpose.

Mr. Race said that he had spent a great deal of his time among the Americans, during the last two years, and had acquainted himself with

nearly all similar publications on that side, and he admitted that it was now pretty nearly equal to the best of them.

The meeting of the old Board then adjourned.

OPEN MEETING.

An open meeting of the Association was held in Albert Hall, Toronto, on Tuesday evening, November 14, at 8 p. m. o'clock. The Honorable Nelson Monteith, Minister of Agriculture for Ontario, occupied the chair.

ADDRESS.

By Hon. Nelson Monteith, Toronto.

It was only on the understanding that the chairman is free from the obligation of making an extended address that I consented to preside at this meeting. Nevertheless, there are a few remarks that I should like to make to those gathered here who are interested, I take it, in the production of fruit, flowers, honey and vegetables, four of the leading products of this Province, which are displayed to such good advantage in Massey Hall. From an economic point of view they are products of the greatest possible value and importance to the community, and the growers are to be heartily congratulated on the notable collection they are able to present to the public. The specimens displayed a very high tribute to the skill of the producer.

In the pioneer days of this Province the simplicity of the life which was led by our people did not call for many products that are to-day looked upon as necessities. Conditions have changed until to-day we find that these products have an important place in every household, and the comfort and welfare of the community is largely increased thereby.

There is a feeling abroad in some quarters to-day that agriculture is second in importance to manufacturing, but agriculture is and will continue to be the primary basis of wealth in the community. The tendency of agriculture to-day is to become more and more a manufacturing industry, and in that sense it is allied to some extent to manufacturing. A study of the business methods adopted by the manufacturer might profitably be undertaken by the farmer. At this period in the history of the country more intensive farming is called for. With the opening up of Manitoba and the Northwest, the conditions surrounding the calling in this Province have greatly changed, and the methods adopted must necessarily change in accordance therewith. The conditions which surround society in the rural districts to-day are such as were never thought of several decades ago. Railroads, telephones, and trolley-lines are spreading through the country and bringing different classes in the community into closer touch with one and another. Land valuations are bound to increase where these conditions obtain, all calling for more intensive methods. You who are interested in the growing of perishable products realize how important it is that they should be placed in the hands of the consumer as speedily as possible, and in this connection the developments I have mentioned are bound to be of the greatest value to the producer.

The vegetable growers are becoming thoroughly alive to the fact that they require to be reasonably close to the point of consumption. In order that consumption may be increased, it is necessary that their product should be of a high standard of excellence, and that it should be placed before the consumer in the best possible condition and at a price that brings it within reach, so that the masses of the people may take advantage of it. The same is true in other lines of horticulture. With these conditions and problems confronting the industry, it will be admitted that there is still room for the closest study and investigation. In the production of varieties better suited to conditions, there is ample opportunity for the best efforts of the scientist and for the best thought and intelligence that can be brought to bear. At this period in the development of the country, this work is very essential. Wealth and population are centralizing to a great extent, and products having special excellence are in increasing demand. This is a happy state of affairs for the producer who is willing and able to produce the best and put it up in the best form for the market.

I have found since it has been my privilege to move around in agricultural circles that what we need in this Province is not so much extensive farming as intensive farming. The smallness of the profit obtained is driving many men from the farm to other callings. This is a trend of affairs that is very much to be deplored. How may this be remedied? It seems to me that it is the duty of those who are better equipped for the battle of life to direct those men who are working at a loss to more intelligent effort—to teach them what things can be done profitably and how to do them in a profitable way. Then the question arises, how are we to get hold of those men who are misdirecting their efforts and securing inadequate returns? How can they be put in touch with those who can aid them to secure a fair return for their labor and thus add to their own prosperity and aid in the upbuilding of the Province. How are we to increase our rural population, and teach those who engage in agriculture to secure a maximum return from the soil? These are among the most important problems that confront us at the present time. While I am prepared to admit that there are great opportunities for the men who settle in the northern portions of this Province and in the Northwest to secure homes of their own at a small outlay, I believe that even greater opportunities exist in some of the older portions of the Province where the capabilities of the country have been definitely ascertained. What we particularly require in the development of this country is men who will add something to the actual wealth of the community, as many of those before me have done in connection with fruit, flowers, and vegetables. Our young men should be taught to realize how many avenues of usefulness are open to them if they will avail themselves of the opportunities that exist in this direction. I feel that it will not be out of place for me to express at the present time on behalf of the agriculturists of this country our appreciation of the fact that our sovereign has seen fit to recognize the labors of one of our leaders of thought in connection with agriculture, namely, Sir William Saunders. It is a recognition of the importance of our calling. It should prove an inspiration to our young men and lead them to recognize that this is a calling in which the best intelligence and effort may be profitably employed.

PRESIDENT'S ADDRESS.

By Alex. McNeill, Ottawa.

I would direct your attention to the report of the executive for particulars of the work done by the Association during the year. It may not be out of place, however, for me to commend particularly the enthusiasm and industry of the Transportation and Co-operative Committees. These have met several times during the year and in their different capacities have done most effective work. Reductions have been made in the freight rates on fruits; attention has been drawn to defects in the transportation system, and the Co-operative Committee can point with pride to a large number of Associations working successfully by co-operative methods. The spraying experiments in charge of our secretary, Mr. P. W. Hodgetts, will be separately and specially reported. The fruit shipments from St. Catharines have been a most important undertaking, and the more so from the fact that there was no guarantee of prices nor any promise of indemnity for losses. In a public-spirited way the St. Catharines Cold Storage Compay arranged and carried through these experiments, a full report of which will be given by the President of the Company.

I need scarcely draw attention to the magnificent proportions to which the Horticultural Exhibition has grown this year. This remarkable interest in the exhibition of fruit, flowers, honey and vegetables has shown the wisdom of those who undertook this work, which is the direct outgrowth of our Association.

I need not dilate upon the important features of the present programme; one is to be found in the reports of committees on the subjects to be brought up at the Dominion Conference of Fruit Growers to be held in Ottawa, in February, 1906. This Dominion Conference, embracing representatives from all parts of the Dominion, will be engaged in the consideration of many subjects of interest to fruit growers of the whole Dominion. It is therefore exceedingly important that you should give the subjects likely to come up at this Conference your careful consideration.

The second subject of very great importance is the discussion of the question of the "Canadian Tariff on Fruits." We must not forget that to us in a large measure is confided the interests of the fruit growers of the Province, and we would be recreant to our duty if we did not protect the interests of our constituents where they come in conflict with those of the munafacturers. It is, therefore, extremely desirable that we should appear before the Tariff Association with a united front and I would strongly urge that all minor differences be dropped and that we join upon the larger issues, so that we will not put upon those who depend on handicraftmanship, whether in the shop or on the farm, the whole burden of building up Canada.

Having said so much with reference to the work of the Association and the subjects which will immediately engage your attention, may I be permitted to call your attention to the general conditions which surround the fruit trade, and lay before you some of the broader problems that will call for serious consideration. As a preliminary I would like to rehearse very briefly the conditions of the fruit crop of the present year.

The season opened with an extraordinary show of bloom which, however, did not materialize in fruit. This failure is probably due to several causes. In some cases cold and prolonged rains were responsible, in others the trees had been weakened by a succession of heavy crops or by the severity of the last two or three winters.

It is scarcely creditable to the traditions of this Association that we have not attempted more systematically to investigate these phenomena, partly for the satisfaction that every intelligent fruit grower has in possessing himself of every fact in connection with his business irrespective of its commercial value, and partly with a view of discovering some means of securing more regular crops by perfect pollination.

The shortage in apples was not confined to Canada. Germany, France, Belgium, Great Britain, as well as the United States report a very serious year. I am sorry to have to report that in too many cases the profits that come from these higher prices will not go to the fruit grower, but to the apple operators who early in the season bought up a large percentage of the prospective crop. I cannot too strongly urge apple growers to refuse to dispose of their crop till market conditions are definitely known. One reason for this is that no ordinary grower can hope to have as definite knowledge of crop and market conditions as the dealer, and is therefore at a disadvantage. There is, however, a higher ground. All such transactions partake of the nature of gambling. The fruit grower, if he gets what is commercially called the best of the bargain, takes money for which he does not give an equivalent; if, on the other hand, he sells below the market price, he is making a present usually to a most unworthy recipient.

The peach growers have had a somewhat remarkable experience that illustrates well the value of fruit statistics. It is a matter of record that there has been a most serious loss in peach growing districts from winter-killing, dating from the memorable season of 1899. The new plantings have not kept pace with these losses and the increased consumption. This year the owners of good healthy trees had a full crop, in many cases much above the average, and so reported. Had the general public taken the fruit crop reports both of the Provincial and Dominion Departments of Agriculture, they would have been prepared to pay an increased but not exorbitant price for peaches, and would have taken all the Canadian crop and probably have imported an appreciable quantity. Unfortunately just at a critical time when the market was depressed with the remnants of the comparatively worthless early varieties, a report appeared in one or more of the Toronto papers, that was very widely copied to the effect that peaches were very plentiful and would be cheaper than apples. For want of a prompt denial, and a true statement of the facts, which should perhaps have been made by our Association, the public continued to expect cheap peaches, and refused to buy in full quantities when the fruit could have been obtained. This unfortunate report, whether it emanated from designing wholesale buyers or from the pen of a poorly qualified newspaper reporter, is responsible for the fact that many Canadian housewives will not serve peaches this winter on the regular bill of fare, as well as for the the fact that peach growers have suffered from a depression of prices much below what was legitimate.

The plum crop was quite sufficient for local demands. The plum rot is yet a most insidious enemy, which our fruit growers have not yet learned to successfully combat. This, and the poor shipping qualities of most of our varieties, renders the extension of plum growing a most serious question.

Cherries of the Morello type have proved a paying crop. Small fruits of all kinds brought fair prices, but the conditions show that the local markets will not bear a much further extension of the industry.

The fruit trade of the Province was never in a more healthy condition. Having said so much, I feel it my duty to add that, though the outlook

on the whole is excellent, there are very grave problems looming up for solution, problems arising, perhaps for the most part, from the very prosperity for which we are thankful. Speaking for a normal condition of things, the local markets are now well supplied. In a few cases it is safe to say that they are frequently much over-supplied, though a partial explanation of this may be in the inefficient methods of marketing.

Speaking particularly of small fruits, any further expansion must be in the direction of long distance markets. The education supplied, the varieties and the methods of doing business must, therefore, conform to the new conditions. One of the first lessons our fruit growers will have a learn in this extension of the small fruit business is that the conditions which surround the growing and shipping for local markets are totally unfit for the distant markets. No progress can be made until the radical distinction between the two markets is fully appreciated. The local markets will permit of comparatively soft fruit, which may be allowed to ripen beyond the maturity point upon the vines or bushes. The long distance market requires that the over-ripe fruit, probably the very best for the nearby market, shall be rigidly excluded from shipments to the long distance markets. In packages, too, and methods of packing a radical change must be made. The basket type, the very best for the local market, must give place to the box type of packages when the fruit is intended for distant markets. This difference in varieties, in the strictness of the grade, in packages will also correspond to a difference in methods of doing business. A local market, such for instance as that of the city of London, can very properly draw upon small growers, entirely independent of each other, located on all sides of the city and long distances apart, but if Ontario wishes to ship to Manitoba, Saskatchewan, Alberta, or even to Montreal, Quebec or the Maritime Provinces, it will not do to take the product of all these small and isolated growers. It will be positively necessary to encourage the growing of these products in large plantations and of concentrating the business at a few points where the growers will undertake to make a specialty of the long distance shipments. It appears to be an almost hopeless task to attempt to assemble the small lots of many different growers who have the local market for their chief outlet.

I admit at the present time we are lacking in varieties, and it will require some courage for growers who have been depending upon local markets as the outlet for two or three acres of strawberries or raspberries to branch out into a large plantation of ten or twenty acres with sole reference to the distant markets. Yet a change in this direction appears to be absolutely necessary.

The competitors which Ontario will have to face will be the American and British Columbia trade. It is needless to say that the American trade is already organized in this way, and British Columbia with her splendid capacity in soil and climate, has no other outlet than the distant markets. It is, therefore, extremely probable that the small fruit trade of British Columbia will be dependent upon long distance markets as is our apple trade and consequently British Columbia will not have the difficulty of educating her fruit growers in the requisite varieties, methods of packing and packages. Indeed, the small fruit trade of British Columbia is now far enough advanced to show conclusively that this is the actual condition, and therefore my statement is not one of prophesy but one of fact. I emphasize this particularly because I do not believe that the individual fruit grower appreciates the wide gulf there is between all the conditions of the local market and the distant market. Our fruit growers, perhaps, do not

appreciate the fact that they have pratically no trade in the North-West in small fruits, and cannot have for the next two years at least as the beginning of the North-West trade must be in the making of the plantations.

To a somewhat less degree the same remarks apply to peaches and plums. New varieties are needed; different packages, different methods of packing and better transportation facilities. Nevertheless some of our present varieties of which there is an excess in normal years will form the nucleus of a profitable trade, if properly packed and carried. This will be brought out in the report of the St. Catharines' shipments of the present year. In addition, however, to such experimental shipments as these followed up by larger consignments on a commercial basis, the fact should not be lost sight of, that Ontario has the capacity of soil and climate to produce an enormous quantity of both peaches and plums, and that, therefore, though just now we are pausing between two great eras in the Ontario fruit trade, yet I think progressive men everywhere should confidently presume upon Canadian skill and intelligence and work out the problem of long distance shipments in both plums and peaches. To this end there should be every year, whether the crop here is small or large, regular trial shipments to Great Britain, that large and ever increasing market that must in the future even perhaps more than in the past be the recipient of our products. There is no reasonable doubt that, with the splendid steamship facilities that are now at the disposal of the fruit grower, we can land peaches in England in the best of condition, if we only have them. It is needless to say that we have not got them this year and may not have them next year, but five or ten years from now there is no reason why the export trade should not form a large proportion of the output of our peach orchards at least. The outlook is not quite so hopeful for plums, but even here fruit growers will have to look at the question in a broad light and appreciate the fact that the ramification of the trade in canned fruits, jams and jellies is one in which they, for the benefit of their particular business, will have to take a lively interest.

The problems in apple growing are somewhat different. We have developed the export trade until it completely overshadows the local trade, large as it is and has been. The steamship facilities and the demand for our fruit are excellent. There are, of course, problems of varieties, of orchard care and of internal and local transportation, but the pressing need at the present time is a better system of marketing. It is safe to say that such wasteful methods cannot be found in any other line outside the fruit trade. Do not misunderstand me—the middlemen who are actively engaged in this trade are excellent business men, and granted that the system they are working under is right, are above serious criticism; but it is the system I am finding fault with. The results of this bad system are to be noted in such facts as these: A barrel of apples, for which in a normal year the grower would be glad to receive one dollar, is shipped to England or Calgary and the consumer of it pays five dollars for it. Apply this same proportion to meats, cereals or dress-goods and where would the prices be? Of course, I do not lose sight of the perishable nature of fruit, and readily admit that as an excuse for many of the bad methods in selling. But the perishable nature of the fruit, the only argument for this most extraordinary discrepancy between the producing and consuming price, will not account for the system of buying which is in vogue in the greater part of Ontario. This system is responsible for much of the waste and the want of proper grading and packing and the serious deterioration between the picking and selling, for the exorbitant price of packages and for the

unfortunate condition of affairs that will enable a number of unscrupulous men to succeed in getting a product without paying a proper price for it. Remember I cast no reflections upon the integrity of the large number of reputable apple dealers, who under great difficulties are doing a legitimate and perfectly honest business, but who, I am ready to assert, would be glad to see a better system introduced and would take up their work with renewed vigor under a better system. I, therefore, heartily commend the work which has been done by our Co-operative Committee, and sincerely trust that this Association will give to this movement every available assistance, both morally and financially.

Those of you who have intelligently followed the fruit trade will have noticed that in the change which now must take place from the local markets to the long distance markets, there comes a distinct question of the matter of varieties. This is so intertwined with the question of soil, climate, and modes of handling that we have reached the point I think when we can fairly ask the Government to bring to our aid an expert who can give his whole time to the development of the fruit industry of the Province. In this connection, it is a source of gratification to me to remember that twelve years ago Professor Craig, Mr. W. W. Hilborn, and myself were appointed a committee to draft an Experiment Station scheme for the Province. We worked earnestly together with the present Secretary of the Experiment Stations for many months, and the result appears in our report, which is the basis of the present scheme. Since that time I have been a Director of the Association, and therefore, of necessity, have had my attention directed officially to the working of these Experiment Stations. I have also served a term upon the Board of Control, and therefore feel that I am justified in taking my full share of the responsibility for the successes and failures which have attended this scheme. On the whole I feel that the Association may be very strongly congratulated upon the success which has attended the work of these Experiment Stations. At the same time I should be sorry to assume that they had reached the climax of their growth. It was never intended, and never thought at any particular stage, that the history of these Experiment Stations would be fixed, but time has very properly been given for the normal development, and we now appear to have reached the point where an onward step must be taken. Up to date the work of these Stations has practically been in the hands of private growers who have had business of their own to attend to, who have had little or no special training for work of this kind and who, therefore, claim no special fitness for anything but elementary work. The time has come when professional skill is needed. We have confined ourselves to a few variety tests, a few climatic tests, and have been eminently successful, but these points settled, we must look at the broader side of horticulture, and note what is being done in other countries for the development of new and profitable lines of fruit growing. We are in need of better varieties. Do not imagine that I am recommending more varieties for the average growers—I am simply asserting what everyone knows to be true, that of the few varieties that should be recommended to the average grower, there are none that unite all the virtues that we can imagine in a fruit. In some lines, indeed, we are particularly lacking here in Ontario. We are lacking particularly in peaches and plums, and the very work of the Experiment Stations themselves would appear to prove that what is needed is the development of new varieties that are specially suitable for our soil and climate.

This expert would be fully informed on the latest and best methods as practiced in the Experiment Stations of the Republic to the south of us, as

well as in the Old Country, and could give his whole time to the fruit interests of this Province. This officer might very properly be attached to the Agricultural College, using the Experiment Stations with their varied soils and climates for the development of his plans, and supplementing the most excellent work of the present professor of horticulture. Unlike the present professor of horticulture he would not be hampered with the daily routine of class work, though his methods and results would be at the service of the students. This, however, is a matter of detail. His main task would be in developing at every corner and in every place the fruit interests of the Province.

The work of Director Groff in Gladioli, and the work of Burbank in all branches of horticulture, have shown how plastic in the hands of a master are the elements that go to make up plant growth. It would almost seem that be can mold these into any shape and form he desires. Species that for centuries were regarded as strictly limited in individuality have been intermixed and absolutely new creations in fruit have been made. With these notable examples before us it is not at all creditable to us that in nearly every case the standard varieties of our fruits are the work of chance. Fruit growers have done little or nothing apparently, either by hybridizing or selection, to develop the qualities which we so ardently desire in our productions. I, therefore, think that I am hazarding little in saying that I believe you will heartily endorse the appointment of someone who will step in at this critical juncture of the fruit industry of Ontario and assist in solving some of the problems presented to us.

The Department of Agriculture at Ottawa took charge of an exhibit of Ontario fruit for the Royal Horticultural Society in London, England, during December, 1904. This fruit was selected from the fruit shown at our first exhibition a year ago. It had been for some time in cold storage, it had been exhibited for a week upon the tables here, had been handled many times, and from the nature of the arrangements under which the halls were engaged the packing was necessarily imperfectly and hastily done. Notwithstanding all these drawbacks the fruit, shown no doubt to the best advantage by the care of Mr. W. A. MacKinnon, late Chief of the Fruit Division and now Canadian Commercial Agent at Bristol, was awarded a silver medal, which has been passed into the care of the Executive of this Association. This exhibition is held annually. It is needless to say that nowhere else could be gathered together a better informed and more influential class of visitors. It, therefore, should be a matter of pride for Ontario to have her fruit products properly represented before this most critical public. The Provinces of British Columbia and Nova Scotia, appreciating the opportunities of such an exhibition, have yearly sent most excellent exhibits, for which they have obtained awards which I am bound to say they richly deserved. I would, therefore, recommend that a committee be appointed, whose special duty would be to supervise a Provincial exhibit worthy of the Province producing nearly one-half of the fruit crop of the Dominion. This committee would require a small appropriation which very properly should be looked upon as a donation to the general public, inasmuch as the results of such an exhibit would accrue to the general public rather than to the fruit growers of the Province.

We are called upon at this meeting to note the death of one of our oldest members, Mr. D. W. Beadle. Mr. Beadle was the first editor of the "*Canadian Horticulturist*", and for many years successsfully conducted that journal. The son of one of the most prominent nurserymen of Canada, and himself a most enthusiastic horticulturist and student of nature, he was

eminentlv fitted for such a duty. Until his strength failed him a few years ago he was one of the most regular attendants at our annual meetings, to which he contributed very liberally both in papers and in criticisms. His unlimited knowledge of varieties of all kinds, his wide reading and his extensive acquaintance with fruit men made him a most valuable member of our Association. Such a career as his cannot be fittingly dealt with in the limited space of an annual address. I have, therefore, suggested that a suitable biographical article be prepared and incorporated in the annual report for 1905.

The death of Mr. Beadle reminds me that in looking over old reports I note the names of several men who have made horticultural history, but unfortunately there has been no provision made for a systematic record of their lives or of the events in which they figure so largely. Though it may not be a matter strictly of dollars and cents, I nevertheless believe that no more valuable and interesting work can be undertaken by this Association than the making of such a record in the field of horticulture. It appears to me too that we are rich enough to be able to permanently mark important places, and to fittingly honor horticultural workers who have distinguished themselves to an extraordinary degree in connection with this Association or in this Province.

It is not creditable to us who live in these later days that it should be difficult to obtain accurate and definite information on the work of Mr. Arnold, Mr. Mills, Mr. Beadle, Mr. Dempsey, Mr. Jas. Dougal and many others. It ought to be still possible to trace with some accuracy the beginnings of several important fruit industries, and it is still possible to mark the location of fruit trees that have a history not less interesting than that of individuals. The original McIntosh Red apple tree is still standing, and its site should certainly not be left without a memorial. The possibilities of the Baxter are too great not to be worthy of attention, and the Ontario is a most creditable contribution by this Province. I am among the few who can claim to have sat under the original Windsor cherry tree, and can yet locate, I think, within a foot the exact spot where this tree grew. Many other names and fruits will suggest themselves to the older members of the Association. Enough has been said, I think, to indicate the work that can be done, and I commend to you the appointment of a standing committee whose duty it will be from year to year to make compilations, recommend memorials and provide for the care of suitable records in Provincial horticulture.

As the retiring President for the year 1905, I bid you welcome to our annual meeting, and, in doing so, may I couple with it an expression of my regret that I feel called upon to sever the close official relations with which this Association has honored me for the past fifteen years. Though I am retiring as an officer, be assured that the time will never come when I shall not be in hearty sympathy and in full accord with everything that can promote the industry of fruit growing in Ontario.

FRUIT MARKETS IN GREAT BRITAIN.

By W. T. Macoun, Horticulturist, Central Experimental Farm, Ottawa.

It was my pleasure during the past summer to spend about six weeks in Great Britain. During most of that time I was among those interested in fruit growing. I went there chiefly with the idea of taking a holiday, but, like most holidays, it was in reality just a change of work. This was my fifth visit, and each time I go there I am more favorably impressed with the country and the people. At first acquaintance one is apt to think that the people are behind the times, things move slowly there, and we are apt to compare the people and their methods unfavorably with our own. When, however, we begin to study the people and the conditions under which they live, we find that there is a system of living and a method of doing business which, perhaps, is unlike that of any other country in the world. England has built up her present prosperity on a very sound basis; her methods are very thorough, and, although they may be slow, yet in fifty or seventy-five years from now we in America may be sorry that we did not adopt the slower methods of Great Britain and build our external on surer foundations.

The more you see of the work being accomplished there in agriculture and horticulture, and all lines of business, the more you are convinced that they go into everything with great thoroughness. It is quite possible that some of their slowness in connection with horticulture is due to the land tenure system, owing to which there is not the same inducement for a fruit grower to plant as extensively as here or in the same way. But things are changing, and the people are getting a better control of the land. Particularly in Ireland, where I spent most of the time, the fruit growers are awakening, and I think we shall soon find that we have in that country a formidable competitor in the British apple market—not perhaps in the finer dessert varieties, but in those suited to more general use. I spent some time in going from one district to another, particularly in the county of Armagh. There I found that young orchards are being set out in hundreds of acres—orchards of ten, fifteen, twenty and twenty-five acres each. The trees run from three to six or seven years old. The practice over there is to grow apples on a dwarf stock. By using the dwarf stock they are able to get a crop of fruit earlier than we can in this country. The young trees come into bearing very early, and are soon profitable. The method I saw adopted, especially in the north of Ireland, was to plant the trees very close together, with small fruits between. The result, it seems to me, will be that when the trees should be producing most profitably they will be too close to enable the grower to cultivate crops between the rows, and without cultivation and sunlight the fruit produced will not be of the best quality. In this country, also, trees are often planted too closely.

I happened to be in Ireland just when the strawberries were in full season, and this fruit impressed me very favorably, even more so than in previous years. The perfection of their fruit is due partly to the fact that strawberries are grown under the hill system, which permits the fruit to get plenty of light and sunshine, and to thoroughly develop. The plantations are usually laid down for three to five years, and the best crop is borne the fourth year after planting. The difficulty we experience in this Province with the hill system is that there is a slight heaving of the plant every winter, as a result of which the crown dries out and the crop produced

is not large. Over there they have no trouble in this regard. Owing to the hardness of the surface of the soil there the fruit lies on the ground without injury.

It was found, as in Canada, that the varieties of poor or medium quality are often the most productive, and to the average grower the most profitable; hence one has to test Royal Sovereign or some other good variety to get a right idea of what can be produced. The best berries are finer in flavor than ours, are also very large, no doubt principally due to the fact that the plants are grown on the hill system, the plants being from 22 to 24 inches apart each way. From three to five crops are usually taken from a plantation. The price of strawberries was, on the whole, lower than in Canada, varying from 2d. to 6d. per box.

In going through the country one is very much struck with the difficulty the farmers and fruit growers experience in working the soil. Cultivation is child's play here compared with what it is there, as our frosts loosen the soil so much that it is comparatively easy to work. Over there the rains which prevail for several months during the winter compact the soil, and in the spring it is in a terribly sodden condition. By the time that the crops are off the ground in the summer you would be surprised to find how hard the surface of the soil is. I think we may be thankful for the ease with which our land is cultivated.

Another factor which will enable fruit growers over there to compete with us is the cheapness of labor. My brother-in-law, who is a farmer there, employs twelve or thirteen men on a hundred and twenty-five acre farm, paying them about thirty cents per day, although some get as high as fifty cents. He has a Massey-Harris binder on his farm, but he finds it just about as cheap to bind his grain by means of hand labor. From this you will form some idea of what we have to compete with in the way of fruit growing. The Department of Agriculture for Ireland is doing a great work for the Irish people, and this, perhaps, is one of the reasons why their horticulture is developing so rapidly.

It was my pleasure to visit several of the horticultural colleges in England, and to investigate their methods of teaching. At Swanley, in Kent, there is a Girls' Horticultural School. There are about sixty-four students in attendance at the present time. No men are admitted. The tuition fee is very high, and this seems to be the principal objection to the Institution. The students are come from a good class. They are thoroughly trained in all branches of horticulture, and they are able to go out from that college and take positions as assistants in gardens, greenhouses, nurseries, etc. I saw a young lady directing the operations of two men in the botanical gardens in Dublin, a proceeding which strikes one as somewhat unusual. You will see, therefore, that over there they are giving young women an opportunity of studying scientific horticulture, a plan which, I think, we might very well follow in this country. I also visited the horticultural college at Reading, where they have students of both sexes. I found that they are doing good work there.

Mr. McNeill has brought up the subject of the value of experimental work in horticulture. While in England I visited an experimental farm of about forty-five acres, conducted by the Duke of Bedford. I do not think there is any station in America that compares with it for thoroughness of methods and range of experiments. They have about eighty different experiments in methods of cultivation. They have a number of varieties growing side by side, and each receives a different method of treatment. One of the most striking results I noticed was the difference in

trees grown in sod and under cultivation. Some were planted in sod from the beginning; others were cultivated for one year and then sodded down; others for two years; still others for three years, etc., and so on. The trees that were planted in sod grew and developed very slowly, and are producing nothing to speak of. Those sodded down three or four years after planting are in a semi-dwarf condition, but those that have received clean cultivation from the beginning are strong, thrifty trees, and producing good crops. I also observed experiments in winter and summer pruning, heading back one-half and three-quarters and without any pruning at all.

I think it will well repay anyone to spend a few weeks in the Old Country in order to study the methods and the people. My judgment is that over there they give more attention to home life, and to subjects that tend towards culture and refinement. In this country we are liable to make our lives too narrow, we spend too much time at our business and neglect our home life, and also to study and compare the results of the labors of others. In respect to these things I think that the people in the old country do better than we do.

CO-OPERATION IN FRUIT GROWING.

By A. N. Brown, Wyoming, Delaware.

I had the pleasure of meeting a number of the members of this Association at a series of meetings held in the Niagara district last March, at which I had the privilege of being present. I am glad to have this opportunity of renewing your acquaintance, and also of making the acquaintance of the Society as a whole. I find that I am on the programme to speak on the subject of "Co-operation in Fruit Growing," but, as I was not acquainted with this fact until a short time ago, I will not undertake to confine myself wholly to the subject in hand.

We find that all classes of citizens, no matter in what profession or industry they may be operating, are to-day co-operating for their own welfare—merchants, lawyers, mechanics, even ministers have their associations. They co-operate for their own better development and for the accomplishment of the things which will aid them in their particular lines. Why does not the fruit grower co-operate in his own behalf? If all others have to co-operate in order to protect themselves and to develop their business, is it not even more needful that the agriculturist and the fruit grower should adopt the same method? In their case it is all the more necessary because of the fact that they have to contend with natural forces to an extent that is not met by those engaged in any other industry.

In studying the question we find that the chief aim of co-operative effort is to secure the proper marketing of the product. If there is one feature in which we, as fruit growers, need co-operation, it is that of marketing. We need co-operation and uniformity in other lines, but more than anything else, we need a fuller knowledge and a more united effort in the way of marketing our product. If there is one thing we are remiss in, as producers, it is in this regard. Manufacturers have little to say at their gatherings as to the processes connected with the manufacture of their goods, but they are continually discussing the market end of their business. Just as soon as the manufacturer finds that the shelves of the merchant and the warehouses are over-supplied with the article he manufactures, he im-

mediately stops the production of that article for a time. On the other hand, the farmer cannot control production, and, consequently, the farmer, and particularly the fruit grower, ought to co-operate. What can we accomplish as fruit growers by co-operation? One of the first objects should be to find a market, and to place our goods on that market in such a way as to attract the consumer. Unless we attract the consumer we cannot realize good prices. Then we require to study the question of transportation in all its phases—the quickest means of reaching the destination with our fruit, the cost of transporting it, the size and shape of the package in which it is marketed.

The individual has ceased in these days to be an important factor in nearly every line of human activity. It is only by united effort that men are able to accomplish anything to-day. We have to co-operate with our Government, and it co-operates with us. Some wonderful results have been secured to our people by the co-operation of the Government with the farmer, by means of the Farmers' Institutes, experiment stations, and the literature distributed. These educational influences have increased the value of the products of the farm to a remarkable extent. I observe that similar results have been accomplished in this country by the same means. Our people have been instructed as to how to grow their crops, and how to market them. Secretary Wilson states that the value of the agricultural products of the United States for 1903 was five billions of dollars. That means that the farms of the United States produced in that year four times the value of our manufactures; that the value of these products for one year was equal to the value of the output of all the gold mines in America since the days of Columbus; that it was six and one-half times greater than the stock in the National Bank; that it was three and one-half times greater than the capitalization of all the railroads; and that the value of the product for one month in 1903 was equal to the interest on our national debt. How has this been done if not through the agencies I have named? In 1903 there were 3,700 Farmers' Institute meetings held, with a total of 10,000 sessions. These meetings were addressed by trained experts, and one million people were reached in this way. Who can measure the educational influence that this agency would have upon production? The Department of Agriculture at Washington has 5,000 trained experts at its command, and distributes twelve million copies of the various reports and bulletins, prepared as a result of their researches, which touch every phase of the industry.

But our Government does still more for the farmer than this. In 1903 when the dread disease known as the foot-and-mouth disease broke out, by the expenditure of a million and a quarter they saved over five hundred millions to the cattle men. We lose every year seven hundred and eighty-five millions of dollars through insect pests which destroy our grain and fruit. In 1903 Washington spent six hundred thousand dollars in this connection, and saved over three hundred million dollars to the grower.

This wonderful showing has been brought about by co-operation on the part of the Government and the people. When the Government helps the agricultural class it is simply helping that class upon which the Government depends. This is not a matter of paternalism, because, when agriculture ceases, humanity will almost instantly cease to exist. Think what it would mean to stop the transportation of food products to the city of New York for even a single day. Discontinue it for a week, and the streets would be filled with perishing humanity. Agriculture is the basis not only of our wealth, but it is the one thing that must exist in order that humanity may continue to exist. We need our manufactures, but you might

stop every manufacturing industry in the country and leave us agriculture, and our people would still support themselves and be, in a sense, prosperous and happy.

As to what fruit growers may accomplish in a special way by co-operation: During the past twenty-seven years we have had quite a number of co-operative associations in Maryland, Delaware and the seaboard states. For seventeen years continuously I have been secretary of the leading association there. We have done one thing that has been of more value to us than anything else, namely, we have succeeded in bringing the cash buyer of our product to our doors. We have drummed for our trade just as every other business man in this country is drumming for his trade to-day, by sending out our representatives and soliciting business from the men in the various cities who are dealing in fruit products. These men now come to us and buy our fruit at our door, and, after that, our responsibility in the matter ends. We consider that, having planted our trees and brought them to a producing age, having picked the crop and packed it for shipment, and delivered it at the railroad station, we have followed it with expense about as far as we are called upon to follow it.

In 1904 we shipped from my station 210,000 baskets of peaches, and not a single carload was sent to a commission merchant. Every basket was sold for spot cash at the railroad. This year we loaded 218 car lots of Keiffer pears, and every one was sold in the same way. We have two stations on the main line of the Delaware railroad, and last year we loaded 62 carloads of fruit every day for several days, and the whole of it was purchased from us f.o.b. This is an instance of what may be accomplished by co-operation; but there are other things almost as important. We have secured, for example, a special fast service for our peach shipments on the railroad. We have solid peach trains, and when they are running the passenger trains are side-tracked to give them right-of-way. During the pear season, pears that are loaded in peach cars go in the same classification, and pay the same rate; and it is the same with apples. We also obtained important changes in the classification of our fruit by the railroad, which could not have been secured except through a powerful organization such as our own. We did not stop with the General Traffic Manager, but went to the Classification Committee of the National Traffic Association in New York, and our negotiations lasted for a period of several years. The first year we accomplished nothing. Amongst other things we desired that pears should be classified the same as apples. Finally, they compromised by permitting us to bill our pears as "Keiffer apples," and, in that way, we obtained the lower rating for them.

As another instance of what may be accomplished by co-operation. I may say that there are two counties in Virginia which produce, as their chief crops, potatoes, both Irish and sweet, and also cabbage and kale. There were times when they could secure not more than fifty cents a barrel for potatoes, and when a glut was on they did not pay for shipment. They finally decided to form an association, which resulted in the organization of the Eastern Shore Potato Exchange. They have been organized for four years, and are to-day handling the crop on a business-like basis. They have increased the value of the product to the grower by one hundred per cent., and they sell every carload right at their station. They have thirty-one inspectors, and every barrel of potatoes they ship is of a certain grade, and bears the stamp of the Association. The Association is a responsible body, and guarantees every carload sold. Last year they handled 350,000 barrels of potatoes, and their telegraph bill, incurred in obtaining informa-

tion on the markets, was $3,200. They can sell their product, while I, as an individual grower, might have a carload on the market and not be able to dispose of it at all. They have built up a reputation so that the consumer may rely upon their brand. As a result of their operations they have increased the value of the land one hundred per cent., and have built up a profitable business. I could give you instance after instance of this kind to show what our fruit and vegetable growers have accomplished by co-operation, and not one of these advantages could have been secured by individual effort. The same is true of similar organizations in the Mississippi Valley and in California. Seventy-five per cent. of the fruit growers of the State of California belong to the California Fruit Growers' Association. Every package of fruit grown by these men bears the stamp of the Association, and every sample of fruit in that package is a perfect specimen. They could not crowd the eastern fruit grower out of the eastern market, if it were not for their superior method of packing, which can be accomplished only by systematic co-operation. Last year the Association notified every one of its members that if they did not spray their trees the Association would not purchase their fruit in the fall. Some of them said that they would not be made to spray if they did not want to, and they did not spray. Consequently, in the fall, the Association refused to take their fruit, and they were obliged to dispose of it on the local market at such prices as could be obtained.

I think that both in this country and in the United States we are on the eve of great things as a result of co-operative effort, so far as the farmers and fruit growers are concerned. When I refer to the two countries, I like to speak of them as being one, because I believe that the destiny of the human race is in the hands of the two great English-speaking countries, Great Britain and America. I, for one, should like to see reciprocal trade between the two countries.

A Member: You need educating on that line on the other side.

Mr. Brown: We do, and on many other lines. Take our experimental station work,—a great deal of valuable information has been secured through this medium, and yet the experimental station idea is in a very crude form as yet. I think the experiment stations have missed the mark to some extent, because their experiments have not been conducted along the lines of average conditions. I can take a calf or a cow or a fruit tree, and, by giving it special attention and great care, can produce a result which I cannot secure by taking five hundred trees or calves. I have surrounded the individual with conditions that cannot be applied to the five hundred. The Experiment Station should conduct its work on such lines as will meet the average condition of the fruit grower. I have a neighbor who sold $1,640 worth of apples from a single acre. If I told you that the fruit growers of Delaware could secure that per acre, you would think me a fool; it is a possibility that happens once in a while and does not by an means represent average conditions. It is necessary that our Experiment Stations should perform their work on a larger scale. They cannot secure average conditions by planting twenty different varieties in twenty rows, each one hundred feet long. In my own State eighty per cent. of the soil is a deep, rich, sandy loam with a red clay sub-soil. But in the northern section there is considerable hilly, rocky land, where the conditions are entirely different to what maintain in the more favored portion. Strange to say, they located the station in the hilly, rocky portion, and are conducting experiments there which are practically valueless for the rest of the State. The latest development of the Experiment Station work is to take a fruit

orchard of twenty, forty or fifty acres as the basis for their investigations. The same principle is being applied in experimenting with corn, and, as an instance of what may be accomplished by the improvement of seed, I would point out that if the germinating power of our seed corn could be increased fifteen per cent. (and this would not be a very difficult thing to accomplish) it would add one hundred and twenty million dollars to the value of the corn crop of the United States. We need more co-operation between the Government and the people. We need the aid of the Government experiments, and the Government is not doing wrong to support an industry that produces the wealth of the country.

I do not think it likely that in the future we shall see any large overproduction by the farmer. The tendency of the people of recent years has been to leave the farm for the city, so that to-day there are not as many men engaged in the cultivation of the soil in the United States as there were formerly. In spite of this fact, however, our knowledge of crop production and the handling of the soil has been greatly increased, so that we are producing more per acre than was formerly the case, and the end is not yet. In 1893 C. Wood Davis made the prediction that the consumption of wheat had caught up to the production, and that the American wheat grower would never see the price fall below one dollar per bushel. Since that time there have been occasions when wheat has been cheaper than it ever was previous to this statement. In making his calculations he had omitted a very important factor. He had failed to recognize that there were forces at work which were teaching our farmers to increase the output per acre. The farmer to-day, who attends the Institute and studies the characteristics of his crop and of the soil, knows where his soil is deficient, and how to supply the deficiency, if one exists. He is an educated man, and is all the time obtaining better results.

The same is true of the results that have been secured in connection with the fruit crop by the introduction of spraying. In the future of fruit growing it is going to be even more surely a survival of the fittest than in some other branches of agricultural effort.. In the future the orchardist must learn to handle his trees with such intelligence as to grow quality into his fruit. Our vegetable growers have learned some of the possibilities in this direction, and I maintain that it is just as practicable to grow quality in an apple as in a cabbage.

The only way by which the fruit growers of Ontario can accomplish great results is to stand together, and work together. We have a striking illustration of this in the Japanese; on the one hand, we saw a people co-opering with their government in wealth and patriotism. Opposed to them, we saw a nation where the very reverse of these conditions prevailed. We are all acquainted with the result. Wherever men unite for a purpose they will accomplish results.

HYBRIDIZING.

By H. H. Groff, Simcoe.

I have been asked by your chairman to say a few words this evening regarding my work as a hybridist. It would be most undiplomatic at this late hour to make my remarks at all extended. I desire first to thank you for the honor done me in electing me one of your directors. While not a fruit-grower, my work in connection with my special line of horticulture has not

been entirely fruitless. It has attracted attention in all parts of the world, while remaining, I must confess, comparatively little known in Canada. It is not possible for me to say much about plant improvement by hybridization in the short time at my disposal. The chief mistake made by plant breeders is that they have overlooked the fact that the biology of plants and animals is practically identical. They have gone about the work of hybridizing or plant breeding in a manner directly opposite to that followed by successful animal breeders. For this reason progress has not been as marked as it would otherwise have been. The science of plant breeding, as well as breeding of all kinds, is attracting great attention at the present time. More progress has been made within the past century than in the whole of the history of horticulture previous to that time. As a field of work it is absolutely limitless. The amount of progress any experimeter will make depends greatly on the concentration and activity he will bring to bear on a certain limited number of lines of investigation. Mr. Burbank has been very much misunderstood, and is at the present moment being severely criticized because of statements made in regard to his work by writers in the public press and in magazines. I am perfectly in sympathy with the sentiments he holds, and I am certain he would not have made many of the statements in regard to his work which are attributed to him.

The most advanced scientific thought of the present moment is that the creation of new types is not the result of gradual work, step by step through a long process of selection, as it was formerly supposed to be. It has been fully demonstrated that by hybridization you may create such a disturbance in the vital forces of the plant that breaks appear and new types are the result, from which we are able to work on more advanced lines. This principle is now accepted by the most advanced leaders of thought. It is a solution of the problem as to how so many different types of plants and animals come to exist in the world at the present time. It was not by gradual development and change, but the outcome of the sudden changes which are brought about as a result of crosses in nature. This work can be hastened by the scientific hybridizer. By his efforts we can obtain more variations in a few years than nature could obtain in countless ages. We draw upon the resources of the past and are rushing into the boundless æons of the future. We bridge over the space between by the performance of a single act, scientific hybridization.

REPORT OF COMMITTEE ON REVISION OF CONSTITUTION.

The draft of a new constitution was presented by the Committee appointed for the purpose, and taken up clause by clause for adoption. Considerable discussion took place in regard to the name of the Association. The Committee recommended that the old name of the Fruit Growers' Association of Ontario be continued. A resolution was moved by Mr. R. B. Whyte that the Association be called the Ontario Horticultural Association. Mr. Sherrington and others declared, however, that the old name should, for a number of reasons, be maintained. In the first place, it was known not only all over the American continent, but in Europe as well, and it would take some time to secure a like recognition for the organization under another title. They further pointed out that the Association under its present name obtained a standing before the Railway Commission, the railway companies and the Government, which it might not be able to hold under the name suggested as a substitute. It was further stated that the Association was largely

commercial in its objects, that the name under which it has been known represented the commercial idea, and that the fruit-growing industry was of sufficient importance to demand an organization devoted solely to the promotion of the commercial fruit-growing interests. It was accordingly moved by Mr. W. L. Smith, seconded by Mr. Sherrington, that the clause in the report be adopted and that the old name be retained. Mr. Groff pointed out that the question to be decided was whether the Association wished to incorporate other kindred interests with that of fruit-growing, as the broad field of horticulture covered those interests, and, as he understood it, the object of the Association was to conserve them all. Mr. Caston stated that a Horticultural Association would in all probability be formed just as had been the case with the Vegetable Growers. If that were done, he did not see what object was to be gained in changing the Society's name. Mr. Woolverton suggested that it would be desirable if the kindred Associations would elect delegates to a central committee to take charge of the Show programme.

Mr. Smith's motion was then put and declared carried.

On motion the words "Fruit and other horticultural products" were added to sub-section E of the preamble.

On motion it was resolved that the word "Society" be added after the word Association at the end of the third line so as to cover local horticultural societies.

On motion it was resolved that the word "shall" be changed to "may" in section 19.

On motion it was resolved that the word "or" be changed to "and" in section 22a, and that section 22b be amended to read "ten days;" that in 22d the words "an officers' meeting or" be struck out.

On motion, resolved that in section 23a ten members should form a quorum.

It was moved by Mr. W. L. Stevens that section 25 be so amended as to provide that the affiliation fee for each Society should be $5.00 and that subscription to the *Horticulturist* should be optional. Mr. Lick moved in amendment that the privileges of membership should be allowed for the 25 cents, not to include the *Horticulturist*. It was moved in further amendment by Mr. Smith that sections 26, 27 and 28 be referred back to the Committee for consideration, and that their report be presented on the day following.

Mr. Stevens withdrew his resolution and seconded the amendment, which was carried.

At a subsequent session, Mr. Bunting presented the Committee's amended report on sections 26, 27 and 28, and moved its adoption. He said: "There seems to be some little difficulty as to the relationship between the affiliated societies and the parent body, and it was with a desire to harmonize any differences of opinion that may have arisen that the report was referred back to your Committee. Sections 24 to 28 inclusive have to do with this matter. In connection with section 25, the point was, I think, raised that at the present time the local societies were not properly represented at the annual meetings of the Provincial Association, and that some provision should be made whereby these societies might be represented by accredited delegates. In addition the objection was raised that in some horticultural societies their members might not care to be compelled to pay for *The Canadian Horticulturist*, the official organ of the Association. I think, however, this objection has been waived, and your Committee therefore recommend that the section be changed to read as follows: 'That the membership fee shall be the sum of $1 per annum, payable in advance, that of this

amount the local Secretary shall transmit 75 cents per member to the parent Society, the payment of which shall entitle each member to receive all the privileges and advantages of membership in this Association.' That section 27 be amended to read that 'Each affiliated society is expected to send at least one delegate to the annual meeting of this Association for each fifty or more members, and that the expenses of said delegates shall be paid by the parent Association.

MR. MCNEILL: The purpose of the Committee is to provide a means whereby local societies may be brought into closer touch with the central Association. In addition to the privilege of sending a delegate free of charge, each member of an affiliated society will become a subscriber to *The Canadian Horticulturist* and receive a copy of the annual report; and any other advantages the Association may have to offer will be at the disposal of the affiliated societies.

Mr. Thompson suggested that expenses should apply to actual transportation expenses only and moved a resolution to that effect.

MR. BUNTING: The point raised was thoroughly discussed by your Committee last evening. Some of the members were of the opinion that the expenses of delegates should be confined to actual travelling expenses. It was pointed out, however, that in addition to transportation expenses, only the actual expenses of the delegates while attending the sessions of the Convention would properly be chargeable to the Association. If delegates were here during the entire week, the amount paid would be made equivalent to the actual time occupied by the sessions of the organizations which they were authorized to attend. On the standing vote the amendment was declared lost and the original motion carried.

The remaining clauses having been adopted by resolution, Mr. T. H. Race moved, seconded by Mr. Harold Jones of Maitland, That the Constitution, as adopted clause by clause and amended, be received and adopted as a whole. - Carried.

(See Appendix "E" for Constitution in full.)

COMMITTEES.

NOMINATING COMMITTEE. W. H. Bunting, St. Catharines; D. Johnson, Forest; H. H. Groff, Simcoe.

COMMITTEE ON FRUIT EXHIBITS. L. Woolverton, Grimsby; L. B. Rice, Michigan; A. E. Sherrington, Walkerton.

COMMITTEE ON RESOLUTIONS. W. L. Smith, Toronto; Harold Jones, Maitland; H. H. Groff, Simcoe.

INTRODUCTION OF DELEGATES.

Mr. RICE, a delegate from the State Horticultural Society of Michigan, said that his Society sent its best regards to the Ontario Society, which they desired him to present. "We are anxious that you should send at least two delegates to our Convention at Grand Rapids. Your delegates are always welcome and are made members of our Society for the time being. Our Society is in sympathy with yours and we wish very much that there could be a levelling down instead of a levelling up of the tariff wall between th-

two countries. The levelling up process has been going on too long. The little selfish idea of building up the industry of one man or one company at the expense of the nation is too small for a real horticulturist to entertain. We in Michigan know that in any levelling down process your growers will have the advantage of ours in our eastern markets, but the interests of the nation are everything and local interests should not be considered. God made the country for the people of the country and not for any one individual or any one company." Mr. Rice stated further that he was a little surprised at the demands made before the Tariff Commission by those interested in vegetable growing when the southern country could supply Canada with all the early fruits and vegetables this country could need. "Why should you not accept them? Why should you raise a tariff wall to keep out these products and then build greenhouses in which to grow them? Do not ask that everyone be taxed for your individual good."

Mr. Norman Jack, representing the Pomological and Fruit Growing Society of the Province of Quebec, was introduced. In a short address he said that he brought with him the greetings of the Society he represented, and of the fruit-growers of the Province of Quebec. The fruit-growing industry was considerably farther advanced in Ontario than in his Province. At the same time they had made progress in many lines. In his own section many men had been spraying for fifteen years, nevertheless there were people there yet who asked him whether he thought spraying was an advantage. The question of varieties most suitable for the locality, the best location, soil and methods of culture, the best methods of packing and shipping to market were questions which were all receiving attention. They had not yet taken the more difficult problems in hand such as co-operation and transportation.

In reference to the culture of the apple orchard, he thought it was a mistake to lay down hard and fast rules in respect to clean cultivation or grass cultivation. In his own district there was hardly ever a time when they had not an abundance of moisture. In the summers of 1903 and 1904, when the drought was so prevalent, their orchards had sufficient moisture. Under the circumstances, therefore, clean cultivation did not seem desirable in that section. Mr. Jack extended the members of the Association a hearty invitation to attend the annual meeting of his Society.

Mr. Harold Jones pointed out that the climate of the two Provinces where they adjoined was identical. He did not consider the question of orchard cultivation had been given sufficient attention. He said "General instructions are given to Ontario orchardists to cultivate often; to keep the orchard clean cultivated say to the first of August and then sow a cover crop. In the east, fruit trees were subjected to very low temperatures. If we follow the plan outlined, the new growth would begin the winter in a green, sappy and immature condition, which generally results in severe loss from winter killing either to the bud, the bark, or the whole tree. My experience has been that in the lower St. Lawrence valley we must use a great deal of caution and intelligence in regard to the cultivation of orchards. We must develop the fruit bud and the wood growth early in the month of June in order to guard against loss of this kind. The fruit bud is fully developed by about June 24th, but the rest of the summer is required to ripen it and dry it out, so that a temperature of 40 degrees below zero will not affect it. Clean cultivation is necessary in order that the trees and the crop may be kept up to normal condition, but to those living in that section, my advice is to cease cultivation by July 1st and then plant the cover crop. In that way we can carry our orchards past the danger of winter killing and bud injury."

FRUIT-GROWING IN ALGOMA.

By Wm. Harris, Day Mills, Algoma.

It may interest you to know of my experience in fruit-growing in Ontario. I settled in the Township of Morris in 1853, and planted the first orchard in Morris in 1858. I planted trees from the Holton Nursery, at Hamilton, of the following kinds: Early Harvest, Maiden's Blush, Colvert, all the family of Pippins, three kinds of Russet, Greenings, Bellefleur, King, Northern Spy, Wagener, and some others. The Baldwin was a failure; all the rest did well.

I settled here in 1879, and planted fifty trees in 1881, the same kind as I had in Huron. Most of them got winter killed. The next kinds I planted were of the following varieties, and all did well: Yellow Transparent, Tetofsky, Duchess, Wealthy, McIntosh Red, Scott's Winter, Alexander, Northern Spy, Longfield, Gideon, Pewaukee, Ben Davis, and Snow. All of these did well except the Northern Spy and Snow, one of each, which the borers killed.

There are many other hardy kinds that will do well here with proper care. "Sun-scald" has injured many trees in Algoma, and many settlers have lost their trees with the borers. Sun-scald never injured any of my trees until last spring. My neighbor has some very fine fruit from Wolf River, Gipsy Queen, and Salome. Plum trees have been a failure, owing to winter killing. What we want most are some hardy plums and pears.

NEW IDEAS IN SPRAYING.

By A. N. Brown, Wyoming, Delaware.

I want this afternoon to talk to you as to what has occurred on our side of the line and what we find ourselves up against, rather than to present any new ideas on the subject of spraying, which the title of my address would indicate I was about to do. At the same time I will bring to your notice any improvements that have been observed in connection with my own work. When I state that some 25,000 gallons of material were sprayed last year under my directions, you will admit that I should have had an opportunity for gaining some little knowledge and experience. My business last year brought me into contact with the leading fruit growers of the eastern seaboard States. They are among the most intelligent and progressive men in the business. I made it a point to observe their methods and to learn all I could, because I am asked to go before meetings like this, and I try to carry with me some of the information which I obtain from these men. I try not only to learn more about it for myself, but to be able to impart the information to others. I hope I shall strengthen some of you as to the necessity of spraying.

The worst pest that we are now troubled with in our part of the country is the San José Scale. It has extended over a larger area in the States this year than ever before, and it is worse on orchards that have been treated for seven or eight years than ever before. We have been spraying for San José Scale for about ten years, and after all the work and energy expended, it begins to look as though we were worse off than at the beginning. I can take you to orchards where until last season they were able to control the pest; they are now entirely covered with scale. There are two reasons for

this. We had a very wet season in the Atlantic Coast States, and one in which the humidity was excessive during the summer. Both conditions appear to nullify the effect of the materials used in treating the scale. That, I think, had something to do with it, but there was another reason and it is the more important of the two. We find that we have, in the badly infested sections, the existence of scale on our shade trees and ornamentals in the towns and cities, and on the forest trees in the country. We have been claiming for several years that scale existed on these trees, but as it takes two or three years before the scale becomes established and is really serious, these trees have not been treated. It has spread to such an extent on these trees, however, that they are now literally covered with it. If you had fire all around the buildings on your farm, you would be correct in concluding that it would eventually spread to them and that they would be consumed. That is precisely the situation in regard to the scale. Our growers found last season that after having sprayed their orchards in March and April as they had been accustomed to do, their trees were reinfested later in the season from the infested trees that were all around them. The birds flying from these infested trees to the trees in our orchards carried the scale with them, and this fall we found that our trees were covered with running larvæ and recently encrusted scale. This state of affairs teaches us that we must spray our trees, not only in the spring, but at some other season of the year as well, preferably I think in the fall. In my neighborhood everybody is now getting ready for fall spraying. The condition I have outlined above is the prevailing one in twelve States. I find that it exists in the largest fruit orchards in those States, running from fifty to a thousand acres.

Another thought presents itself in this connection, which is, that when we spray in the fall, we are spraying the scale when it is least resistant. Formerly the whole work was done in March and April, when it was most resistant. If we spray now. we shall catch the running larvæ and those insects on which the incrustation is still soft, and of course, the scale is much more effectively treated at these stages of development than later on. We have this additional compensation also that, if we do not succeed in killing the scale in the fall spraying, we shall have another chance at it before the breeding season begins in the spring. For the reasons I have indicated, our largest growers have concluded that they will have to spray at least twice a year for the scale.

Some one may ask why we do not spray in the summer season. We have not adopted this method for the reason, first that we do not care to apply the solutions used to our fruit, and second, because it is very difficult to cover every portion of the tree when it is in foliage. We therefore concluded that the better way was to spray immediately after the leaves drop. This we consider a new departure in our section. Our growers are compelled to fight the scale because of the general infestation all around them. Dr. Smith told me recently that there was not a single town, village or municipality in the State of New Jersey but was thoroughly infested, and that he was recommending the municipal authorities to take the matter up and spray vigorously. Professor Surface says that precisely the same condition of affairs prevails in Pennsylvania. That State is doing more to destroy the scale than any other Government that I know of. They have inaugurated a movement that is simply wonderful. At the last session of the Legislature they appropriated $35,000 to the agricultural department of the State to be expended in demonstrations in spraying in every fruit growing community in the State. The delegations follow the plan of first identify-

ing the particular pests that are most troublesome in a locality, after which they teach the growers how to make and apply the various mixtures to be used in treating them, just as the demonstrators of cereal foods go up and down the country demonstrating their products. In order to properly inaugurate this movement and put it on a practical footing, they compelled their twenty-one orchard inspectors to take a special course at the State Agricultural College so as to instruct them precisely how the mixture should be made and applied. They were then given pumps and machinery and put to work. They spend two days in each district. On the first day the inspector visits the largest orchards, identifies the pest by taking cuttings of infested branches. These cuttings he takes to a public meeting, held in the forenoon of the second day. At this meeting he submits the specimens to examination under a compound microscope to those gathered, so that every grower may examine the pest and acquaint himself with its characteristics. After the inspectors have described to the people the nature of the pest and the methods of treating it, they proceed in the afternoon to the orchard and mix and apply their solutions. The eyes of every State of the union are now on Pennsylvania to see how she will succeed in her efforts. The fight against the San José Scale is a fearful one and if we do not succeed, we shall have to go out of the fruit business. You in Ontario may not have reached the stage, in any of the districts where scale is found, where the reinfestation I have described takes place, but sooner or later, my belief is, a similar state of affairs will be found here.

I may say that in Pennsylvania Prof. Surface sprays only with the boiled lime, sulphur and salt solution. I am a little surprised at this , because experiments conducted at Geneva and Cornell show that the result of spraying with this mixture in the fall is that the trees throw from twenty to forty per cent. of their buds. It would be advisable to leave the salt out of it for fall spraying. There is a similar danger in spraying with crude petroleum in the fall. I am not here to advocate any of the combination washes but we have about concluded that they are the safest to use for fall spraying. There are many of these on the market, but there are only two so far as I know that we have any particular confidence in. I refer to Kiloscale and Scalecide. Both these washes are similar in their results, although the latter is perhaps a little the stronger, and it is almost forty per cent. cheaper; in fact it is no more expensive than lime, sulphur and salt. It is absolutely soluble in water, mixes instantly, and will not separate after it is mixed. It was sent out to twenty-one States last spring. I have seen reports from most of them made to the Pratt Company in New York, and all stated that it was the most effective of the washes used. My own experience with it has been very satisfactory. It is being applied to all my trees now.

Kerosene Limoid has proved very ineffective in our State. This is attributed to the fact that the lime used was a low grade process lime. Mr. Macoun at Ottawa overcame the difficulty by employing a coarse grade of flour, and it worked very nicely. I should like to ask Mr. Macoun whether he calculated the exact cost of the mixture?

Mr. Macoun: We found it very little more expensive, but we find freshly slaked lime just as effective.

Mr. Brown: Process lime has been recommended for the making of Bordeaux, but I do not intend to use it for that purpose, nor do I intend to slake lime for a stock solution and leave it standing. In this connection there is a point that should be noted. On one farm in New Jersey a man ruined his entire apple crop by the application of Bordeaux. I had recommended it to him for the codling moth. I told him how to mix it and cau-

tioned him against wet seasons, etc. He made the mixture with equal amounts of lime and bluestone and, as it was a wet season, his apples, which were Staymen Winesaps, were scalded with the material. He overlooked the fact that, as it was a wet season, more lime was required to neutralize the acidity of the bluestone. I used this season twelve pounds of lime to eight of bluestone right along. I find that a great many people burned their apples on this account.

In our fight against the scale we intend to use oil combinations this fall. While the lime, sulphur and salt solution is perhaps the best remedy that can be used against the scale, I do not suppose there is a single grower who cares to contemplate the prospect of mixing and applying this solution during the rest of his business career. Consequently I am encouraging the use of combination washes and looking for something that will prove satisfactory. With the combination wash one gallon is mixed with so many barrels of water and consequently we know that the solution we are using will be of uniform strength throughout. No matter how careful we may be in mixing the lime, sulphur and salt, I do not believe that any five barrels would analyze exactly the same. The necessity for purity in spraying materials is nothing new but I wish to emphasize it.

Within a radius of three miles of where I lived there is a party who used the lime, sulphur and salt solution boiled. He has succeeded in exterminating the scale and in marketing a crop of fruit that was entirely free from it. Yet in the same neighborhood there are half a dozen men who use the same application and their crop is not marketable. I find that this condition exists in every State which I visit. I find that the identical wash is perfectly satisfactory with one man while it is a complete failure with another. The only way I can account for it is that, where failure has occurred, some detail of the work has been neglected somewhere along the line. It cannot be otherwise. Effective spraying will not admit of any guess-work or of careless methods. We have simply got to do it in the right way and do it thoroughly. It will not answer to drive along a row of fruit trees as fast as the horse walks and say that you have sprayed those trees. Unless you cover every part of the tree, much of your time is being wasted. This is not a new idea, but I want to impress the necessity for more thoroughness in our work.

No matter what make of pump a man uses, one thing is certain—you have got to have power; and manual effort will not furnish the right kind of power for effective spraying. Therefore, I always advocate the use of power sprayers wherever practicable.

In connection with pumps, there are a great many points that should be taken into consideration, and to many of them we pay but little attention. The nozzle, tubing, and valves have all to be considered. What is the use of a high pressure if we sacrifice that pressure before we get to the end of the nozzle? We must remember that we have to spray our trees and not sprinkle them. The only way to get a fine mist-like spray is to have sufficient power generated, in the first place, and then to see that the power is not dissipated before the spray leaves the nozzle. Therefore, it will be seen that every valve or tube or aperture which is too small for the amount of material that has to be carried through it, is lessening the force. I find that 1-8 inch brass tubing is being used in all the bamboo rods. With 100 to 120 pounds pressure you cannot carry sufficient material through 1-8 inch tubing to supply two or three nozzles. A tubing of aluminum has lately been introduced, which is 3-8 of an inch in size and is lighter and more durable than the brass. With this tubing an eight foot rod weighs 1½ pounds,

while a similar rod with the brass tubing will weigh two pounds. The larger tubing will carry the material to the nozzle without any sacrifice of power. The chief point to be observed in this connection is to see that in your tubing, valves and joints there is no point of resistance until the hole is the nozzle is reached. Then you will have a spray that has surface covering power and capacity. The point in spraying is to cover as much surface with as fine a fog as possible. The fog strikes the underside of the leaf just as much as it does the upper side and every part is reached.

There are a number of good nozzles on the market. 'One of the chief points to be observed is that the nozzle does not offer resistance to the passage of the spraying material by a decrease in the size of the aperture or in any other way. One of the newer types is seen in the Buffalo nozzle. This is a straight type of nozzle, without any bends or turns and the bore is as large as the tube itself until the nozzle-cap is reached.

A Member: A grower in my section used this lime and sulphur wash in the fall with bad results. He claims that the bud was not sufficiently protected at that time of the year.

Mr. Brown: It was probably due to the salt in the mixture. The fruit bud is more tender just when the foliage drops from the tree than at any other stage in its existence. For this reason care must be observed in fall spraying; but what are we to do when it is a question of remaining in the business.

Q. Are your vineyards seriously affected?

A. Not in my neighborhood. I saw for the first time in New Jersey last week a vine that had scale on it. As bad as the year has been on account of the excessive humidity which neutralized the results of spraying to some extent, yet I have a letter from the most prominent grape-grower in Delaware, who writes me that he sprayed his grapes from four to six times using Bordeaux mixture, spraying the first time when the new growth was ten inches long. As a result 99 per cent. of Moore's Early were absolutely perfect, as were 94 per cent. of his Concords and 92 per cent. of his Niagaras. His crop realized $6,500 at the vineyard. Many of his neighbors who have not been giving attention to their vineyards did not market a single package of grapes this fall. I have another letter from a gentleman in Pennsylvania who is located in a scale infested district and where the codling moth was particularly bad this year. He says "We finished picking our apples and they ran 97 per cent. perfect, and realized $2.15 per barrel in the orchard." Spraying not only makes perfect fruit, but it improves the quality of the fruit. When you have fruit that is as perfect as the above, you also have perfect foliage along with it, and the result is an apple of higher quality. To-day the consumer is asking for high-grade fruit, and the fruit grower must produce something that will supply this educated demand.

Professor Shutt: I regret that Mr. Brown has been compelled to leave, as I should have liked some further light on one or two points. The point was raised as to the effect on foliage of the lime, sulphur, and salt wash, and it would be interesting to compare the effects of the self-boiled wash in this connection. The object of adding the salt is to raise the boiling point and thus bring about a more complete union of the sulphur with the lime. I do not see why the salt should be injurious to the foliage. I understand that there is a certain amount of caustic soda formed, but the main portion of the salt would remain as sodium chloride. We add caustic soda in large quantities to our self-boiled wash. The uncombined salt could not be injurious as it is a natural chemical compound and not caustic in its nature.

In regard to the mechanical emulsion,—flour and petroleum—we gave it a pretty fair trial and it makes a splendid emulsion, but does not last as long as one made with freshly slaked lime, and we cannot recommend it where it is important to carry over the emulsion.

There is another point which I do not understand, and that is why process lime will not make as good an emulsion as freshly slaked lime. I do not know what the Americans mean by process lime unless it is what is termed carbonated lime. The object is to finely divide the kerosene, no matter what substance mav be used, and if the lime is fine enough I do not know why it should not be effective. Carbonated lime is more granular than freshly slaked lime. In regard to such products as Kiloscale and Scalecide, I regret that Mr. Brown gave us no indication of their constituents. If they are oil compounds, what is it that holds the kerosene in emulsion? I think it is important before advocating these proprietary compounds that we should know what we are using.

Mr. Tweddle: We tried the flour and kerosene emulsion on a small scale, but found it did not hold in suspension well, and was difficult to force through the nozzle.

Mr. Shutt: We never had any trouble in regard to the nozzle. The emulsion is just like cream, and there are no lumps in it. It you put the kerosene on top of the flour and add water and churn for five minutes, there is no difficulty.

Mr. Tweddle: Mr. E. D. Smith experienced a similar difficulty. Another trouble we had was to know how to handle air-slaked lime and get it right. We did not know the quantities of water and lime to use.

Mr. Shutt: The lime must be thoroughly burned, or it will be lumpy, and it should not contain much magnesia.

Mr. Macoun: We found in our experiments that where the lime was a little damp when slaked it made a better emulsion, so that it is not necessary to have a drv powder as one might think.

REPORT OF COMMITTEE ON NEW FRUITS.

Presented by H. L. Hutt, Professor of Horticulture, O. A. C., Guelph.

Seedling Apples.

From Mr. Wm. Jarvis, West Gravenhurst, Ont.

No. 1. Seedling from Duchess of Oldenburg; medium to large ($2\frac{1}{2}$ x $2\frac{3}{4}$), roundish, smooth; yellow skin, lightly covered with pale red with scattered purplish streaks. Somewhat like Duchess in appearance and quality, but keeps for a month or two longer. No doubt valuable for the north.

No. 2. Medium size, roundish oblate, smooth and handsome; resembles Wealthy in shape and coloring. Fine grain and good quality. Matures in October and keeps till February. The most promising of the lot.

No. 3. Small to medium. White skin, well covered with light and dark red on exposed side; numerous dots. Flesh white, good quality. About the size and a little of the appearance of Snow. Matures about middle of September. Has long thick stem and long closed calyx.

No. 4. Medium size, roundish oblate; yellow skin well covered with broken stripes of light and dark red. Like a well colored Duchess. Calyx lobes very short and open. Small core. Fair quality. Season October. A handsome apple and promising for the north.

From Walter Cowan, Guelph.

Medium to large; roundish oblate, waxy light; yellow skin, lightly shaded on sunny side with lighter red. Stem short and thick in deep wide cavity; calyx very small and closed in small smooth basin. Showy apple, a little of the Colvert type, but handsomer and evidently a good keeper. Firm, and crisp, quality said to be excellent.

SEEDLING PEACHES.

Sept 29th. Received from Wm. McFarlane, 137 Catharine St. South, Hamilton, Ont.

A large yellow-fleshed, freestone of the Crawford type. Showy in appearance, of excellent quality; maturing about last week of September.

Oct. 21st. From W. M. Orr, Fruitland, Ont.

A large yellow-fleshed freestone of excellent quality, ripening second or third week in October. Promising because of its large size, good quality, and late season of ripening when most of the good peaches are past.

Mr. Orr says: "It is much superior in color, size, shape and flavor to any other late peach that I know of."

NEW FRUITS.

W. T. MACOUN, HORTICULTURIST, C.E.F., OTTAWA.

The annual presentation of the report of the New Fruits Committee cannot but help to suggest to the minds of this Association the question: Is this report of any value, and is anything being done to further test the promising varieties mentioned in this report, or is any work being done in Canada to originate new varieties suitable to the best fruit-producing districts? All these questions can, we think, be answered in the affirmative. This report is valuable because it places on record the names and descriptions of all the promising fruits which came before your Committee during the year. Should any of these varieties in future years find their places in the commercial nurseries of the country their history can be traced and their original description compared with that given by the nurseryman. This report not only serves as a record, but it brings these varieties and their qualities under the notice of all the members of the Association, so that anyone wishing to test the more promising ones can do so, providing scions can be obtained. In reply to the next question as to whether anything is being done to further test the promising varieties mentioned in this report, we may say that practically all the promising varieties of fruits which are personally examined, that are at all likely to prove hardy, are being tested at the Central Experimental Farm, and we think should be tested at the Ontario Fruit Experiment Stations. If a man sends in a seedling apple, for instance, and it is considered promising, scions are asked for and if received

are propagated at Ottawa and later on the young trees are planted in the orchard. At present there are about 100 promising seedlings of apples alone being tested in this way. The results of such tests take time and it has always been the policy of the Horticulturist at Ottawa to thoroughly test a variety before recommending it for general planting. For this reason there have been comparatively few additional kinds added to the list of those recommended. When we are convinced, however, that a variety is a decided acquisition the planting of it is strongly encouraged. The McIntosh Red, North-Western Greening, and Milwaukee apples are varieties of comparatively recent introduction, the planting of which has been recommended in this way. The Ontario Fruit Experiment Stations have furnished much useful information as to the value of the newer named varieties in the various parts of the Province. A large number of seedling apples from seed of McIntosh, Fameuse, Swayzie Pomme Grise, Lawver, Northern Spy, Salome, Wealthy, and others are under test. Quite a number of these fruited this year for the first time. The majority of these were apples of good size and fair quality, but few are sufficiently promising for further test. There are nearly 2,000 of such seedlings to fruit yet. There are also a number of crosses, the parents of which are McIntosh, Lawver, Northern Spy, Milwaukee, and North-Western Greening, from which something good should be obtained. There are also seedling plums, currants, raspberries, strawberries and grapes out of which there are some which we are confident will find a place among commercial varieties. The work of Dr. Wm. Saunders in originating hardy apples for Manitoba and the North-West is well known to this Association.

There have been comparatively few new varieties come under our notice this year, but the following are those considered most promising:—

Seedling Crab: Marrison, R. A., Cataraqui, Ont. Fruit, large size for a crab, 2x2½ inches: form roundish, slightly angular: cavity, medium depth and width: stem long, slender: basin open, medium depth, much wrinkled: calyx closed: color yellow, well washed with deep crimson and splashed with dark crimson: dots few, yellow, distinct: skin moderately thick, moderately tough: flesh yellow, tender, juicy: core medium, flavor briskly subacid, pleasant, very little astringency: quality good for a crab: season probably early to mid October.

A handsome crab of the largest size. May prove desirable as a late variety.

Apple: Coughan, R. (M.D.), Hastings, Ont.

Fruit, medium size; form oblate to roundish; cavity deep, medium width, russeted; stem short, slender; basin medium depth and width, smooth; calyx probably open; color yellow, almost entirely covered with bright crimson; dots moderately numerous, yellow, distinct; skin moderately thick, tender; flesh white tinged with red, tender, juicy; core small; flavor briskly subacid. Little decided flavor; quality above medium; season probably mid September.

A seedling growing in remote part of farm near Hastings village. A very handsome apple of good shape with an aroma. May prove a useful apple at this season of the year.

Apple: Pratt, Wm., Penetanguishene, Ont. Seedling No. 2:

Fruit medium size; form roundish; cavity narrow, medium depth; stem, medium length, moderately stout; basin, medium depth and width, wrinkled; calyx partly open or closed: color yellow, well washed and splashed with rich crimson; dots numerous, yellow, distinct; skin moderately thick, mod-

erately tough; flesh dull white, firm, juicy; core small; flavor subacid, pleasant, not high; quality above medium, almost good; season probably early winter. Tree supposed to be a seedling of Wealthy. Grows on an adjoining farm to that of Wm. Pratt. A handsome apple, worth testing.

Pear: Williams, J. S., Bloomfield, Ont.

Fruit: Size above medium; form, obovate, obtuse, pyriform; cavity, shallow, medium width; stem, stout, medium length; basin, medium depth, and width, smooth; calyx, open; color, yellowish green with a bronzy red blush on sunny side; dots obscure; skin moderately thick, tender; flesh, yellowish, tender, melting, slightly granular, juicy; core, medium; flavour, sweet, good; quality, very good; season, probably late October; tree, a cross of Belle Lucrative and Josephine, as hardy as the Jules, season, November. General Notes: A good deal like Belle Lucrative in flavor, promising.

The Americana plums are proving of such value over a large portion of the Provinces of Ontario and Quebec that we take this opportunity of referring to a few of the best of the newer introductions which have fruited at Ottawa, in the hope that at least some of them will soon be offered for sale by our nurserymen. Those considered the most promising are: Admiral Schley, Bomberger, Oren, Lottie and Smith, although there are other very good ones. These are described in the 1904 report of the Horticulturist, Central Experimental Farm.

We would also like to draw the attention of this Association again to the Herbert raspberry originated by Mr. R. B. Whyte, of Ottawa. This is decidedly the best red raspberry in the plantation at Ottawa, and has gained friends wherever it has fruited. It is now on the market.

ADDRESS.

By Hon. Sydney Fisher, Minister of Agriculture for Canada.

I do not come before you this afternoon with the idea of delivering a set address to this gathering. I was fortunate to arrive in time to hear a portion of Mr. Brown's remarks on the very important question of spraying. It is one which has attracted the attention of our fruit growers and even of our farmers for a number of years. It is a subject in which great progress has been made and will, I believe, continue to be made, not only in the practicable application of methods, but also in the discovery of agents for the destruction of insect and fungous growths, and in the various preparations used in spraying. I noted in those remarks one or two matters concerning which I should like to say a word or two. Mr. Brown spoke of the ravages of the San José Scale in the United States. We, in Canada, are to be congratulated that those ravages are very restricted here. It is true that in this Province there is a certain comparatively small section which is, I believe, somewhat affected. I am glad to say, however, that by reason of the law against the indiscriminate importation of nursery stock from those countries in which the scale exists, no new outbreak has occurred in Canada since that law was placed upon the Statute Book and enforced. I congratulate the people of Canada that the law has been effective in preventing the introduction of this enemy where it was not known before the existence of that law, I will go farther and congratulate the people of Canada on the fact that by reason of the provincial organization in this Province, the inspection, and

the insistence on a proper fumigation of nursery stock, there has been no spread in the Dominion of that dreaded enemy through any parts of the country which were not affected before the matter was taken up by the Government. This shows that, so far as Government work is concerned in this country, it has been as effective as it could have been. It is true that in places where the scale previously existed it has not been stamped out; but the experience of other countries has been that where scale did exist, it has continued to spread and become worse and worse. We have been saved from this by Government intervention, first of all by the steps taken to arouse the public to the danger impending, and second, by the preventive measures that have been taken to prevent its spread.

I spoke about the Provincial organization in aid of the farmers and fruit growers, especially yours in the Province of Ontario. By our constitutional arrangement in Canada there are certain classes of subjects relegated to the Provincial authorities and other classes which are relegated to the Federal authorities. It is well that the people should understand this division, and that each authority should keep to its own work as much as possible; and where there may seem to be some overlapping, that the two authorities should work co-operatively so as not to interfere each with the other's work. Matters of trade and commerce are especially relegated to the Federal authorities, and more particularly is the Government at Ottawa and for this purpose my own Department entrusted with the matters of Trade and Commerce. Matters of teaching and education are especially relegated to the Provincial authorities, and it would not be well that the Government at Ottawa or any Department of it should enter into that field, either interfering with the work of the Provincial authorities or duplicating it, or overlapping it. So far as I am personally concerned, I have quite enough to do in the sphere of work, which is legitimately put into my hands so far as the agriculture of Canada is concerned, without being ambitious of having thrust on me or trying to grasp any work that does not properly belong to my Department. I am in that happy position of having more to do probably than I can do as effectively and well as I should like, and it is not my personal desire to take upon myself or upon my Department any work that I have not got to do. Therefore I think it is wise and right to leave purely educational work to the Provincial authorities all over the Dominion. I am well aware that our experimental work, and the issuing of information gained by those experiments, is to a certain extent educational. Still it is not what might be called local education or schooling in the strict sense of the term; it is the result of certain experimental investigations; and of course we have to give to the public the information acquired in conducting those investigations. When it comes to the question of dealing with what I may call purely local work such as the details of fruit growing, details of orchard management,—I am talking of these particular things because they are all especially interesting to you—these things are local in their character, vary very greatly in different parts of the country, and are more bound up with local education. Therefore it is better to leave them to the Provincial authorities who understand better the local conditions and circumstances. When it comes to the larger questions which apply equally to the whole Dominion, to those questions of inter-provincial trade and the management of it, still more to foreign trade and the management of it, it is proper and right that the Department of Agriculture at Ottawa should deal with these problems and that the local authorities should place upon our shoulders the responsibility in connection therewith. The work of the Department at Ottawa is more particularly directed in

the fruit branches to those things which apply to the whole Dominion and are not, strictly speaking, of local use or of local educational effect. I want to give this explanation for two reasons, first, to let you understand what you may fairly call upon us to do, and second, what is the nature of the responsibility that we wish to throw upon the Provincial authorities.

In regard to what the Department at Ottawa has done and is doing, you are, I am aware, pretty familiar with it. My various experts have been going about the country and mingling intimately with you. I am proud to say that in the service of the Department at Ottawa, in matters which pertain to your branches of industry, as in many others, I have a most efficient and effective staff of officers, who are doing excellent work for the people of Canada. As we are dealing principally with commerce and trade and not with the details of local work, our work for the fruit growers is intimately allied with some other work which we have to do. In this connection I want to give some explanation regarding the choice of the official who has been placed in charge of the Fruit Branch. Some criticism was aroused a little while ago on account of the fact that when an independent Fruit Branch was established in connection with my Department, a practical fruit grower was not placed in charge. You are aware that Dr. Robertson left the Department a short time ago, and as a result there was some re-organization in which I had to divide more or less the work he had been at the head of, among certain other officers of the Department. I examined the different kinds of work done in his branch to see how they could best be arranged and classified. I found, as a matter of fact, that questions of transportation were intimately allied with cold storage transportation so far as our work was concerned, and that they were also allied with what we called under Prof. Robertson's administration, the Extension of Markets' Branch. These two particular branches deal with the transportation of all perishable products of our Canadian markets, such as butter, cheese, meats, fruits and vegetables, and not only with the transportation of these products but with the handling, packing, management abroad, and the supervision of the handling of these articles at our export ports and in England, our great market. The same men looked after the fruit as looked after butter and cheese, not because they were experts in fruit or in dairying, but because they were charged with looking after the handling and transportation of our perishable food products. I found as a result that the management and control of these important branches of the work of my Department must necessarily be kept together, if it was to be properly and effectively carried out, and that I could not divide it without detriment. For that reason, all this work was put under the charge of Mr. Ruddick, formerly assistant to the Dairy Branch, but who now has charge also of the Transportation Branch and the Extension of Markets' Branch. Otherwise, so far as any expert work or opinion in connection with fruit is concerned, just the same officers are in charge of the business as were in charge under Professor Robertson. There is no change so far as the work is concerned, and there is the same efficient co-operation and work being done for all these interests. It is not a question of persons or individuals at all, or of the largeness of the interests; it is a question of the administration of the work of the Department, not for the convenience of the officers, but for the efficiency of the work that this arrangement was found necessary. I am glad to know that, since the first discussion of the question arose, the work has been going on equally as successfully as before; and I believe that the first idea which prevailed among a number of the fruit growers of this Province has disappeared, and that they are now satisfied with the arrangement.

In regard to other matters that are under our jurisdiction, intimately allied with the question of transportation is the question of preparing the product for transportation and for the market. For a good while back one of the most serious difficulties that our Canadian fruit has had to contend with in the foreign market (also to a considerable extent in our home market) has been the complaint as to improper grading and packing. We have had the keenest competition from abroad. Why is it that California stands pre-eminent in her fruit business? Not only because she has been able to produce very large quantities at home, and because the character of her fruit is in a general way better adapted to carriage and transportation, but because,—and perhaps this is the most important reason of all,—of the organization of the fruit interests of that country by means of which growers have been able to select, grade, and pack their fruit in a way that suits the market better than our people have been able to do. It is for this reason that she has been able to keenly compete with our growers not only abroad, but in our own markets, and especially in the Western markets. In a general way her fruit is not as good as ours in quality; her peaches are far inferior; her pears may be as good; some of her plums are good, but not equal I think in quality to our own; her grapes are of a different character and suit some markets better than ours; but the great reason for her success is found in the organization of her interests, which has enabled her to put her fruit on the market in a more attractive shape than our own.

Why cannot the fruit growers of this country organize themselves co-operatively as they have done? Is it because we are less intelligent, or because we have local jealousies which prevent, or is it because each of us wants to get the better of his neighbor? I do not know what the reason is, but I find all through our whole social and commercial system the same difficulty in getting our people to work harmoniously and co-operatively together, a difficulty which does not seem to exist in some foreign countries. California has set us a great example in this respect. In Denmark we see the results of co-operation and mutual help, which threaten to endanger our position in the English market in regard to the bacon and dairy trade. There is something wrong amongst our people; something wrong, perhaps, with our social system, which prevents that co-operation and organization which these people seem to be able to carry out, and by so doing to meet us in the competitive markets, and to some extent in our own markets. I want to say to you fruit growers that you ought in your own interests and in the interests of your community to try to remove that difficulty, and form associations, or get together co-operatively, and do your work so that the whole district may reap the benefit of mutual help and confidence. One of the greatest stumbling blocks in the way of the marketing of your products is in the lack of that organization and co-operation. You may say that your interests are not so large; that California has been able to do this because of her enormous production; but I claim that, for this reason, it is all the more necessary that our people should work together. If one individual in a particular neighborhood cannot supply enough fruit to provide car load lots of fruits to fill certain orders, and to make an impression on the market. it is all the more necessary that a group of neighbours should join together to meet the demands of the market and make arrangements which will enable their fruit to be sent forward in large quantities in order to meet the competition of these other people.

We are ready and should be glad to give every assistance on our part so far as the imparting of information goes. We cannot undertake to mix up in commercial undertaking; that is con-

trary to the duty and spirit of departments of Government; but if it is useful that information in regard to these things should be gathered and placed at your command so that you may be able to do this, we shall be only too glad to get that information and place it at your command so that you may be able to act upon it and adapt it to your conditions. As an evidence of our desire, I will point to the fact that lately I brought from the West an expert packer, who has been giving demonstrations in fruit-packing in various parts of eastern Canada. Since that occurred, I have not had an opportunity of getting a report upon his work, but incidentally I have learned that he made some interesting exhibits of his work, which will, I have no doubt, be of some benefit. If more of that kind of thing is required, I shall be only too glad to carry it out.

I may say that I again visited British Columbia recently, and there found an evidence of improvement in selection and packing which is very gratifying. When I visited what are now the Provinces of Alberta and Saskatchewan four years ago,—which is the territory nearest to British Columbia,—I saw everywhere California fruit in command of the market. I found on this second trip that the British Columbia fruit had practically driven it out of the market, and the fact that it had done so was due almost entirely to the improvement that had taken place in selection, grading and packing. They are able to place their fruit before the consumer just as attractively as any of the Californian Associations, and the result is that the people of the country buy it in preference to the foreign fruit. If you want to get an entry into the Manitoba and Western markets (and I believe that, under existing conditions of transportation you have a little better chance in the Manitoba markets than the British Columbia growers, and might compete on even terms with them still farther West)—if you want to succeed there, it is necessary that you should put your fruit up as well or a little better than they do.

I am not going to say anything about the working of the Fruit Marks Act. That Act was introduced because of the almost universal complaint in regard to the packing of our fruit. I have the most gratifying testimony from abroad that the results have been extremely beneficial. We have been somewhat slow in putting it energetically into force; it was a new thing; it was pretty severe in its provisions, and therefore I instructed my officers not to be too hasty or too severe for the first year or two. I think the time has now come when the law may be fairly enforced in all its severity, and I think that in the interests of the fruit growers and of the honest, intelligent packers, as well as in the interest of the consumer, the provisions of the Act ought to be strictly enforced, and I trust that this will be the case another season. That the Act is good and that it is effective is proved from the fact that in no case, or at any rate, in very few cases, has there been a failure to convict whenever the machinery of the Act has been put in force.

We had a deputation of dealers in fruit come before the Tariff Commission yesterday. I asked them amongst other questions about the packing and grading of our fruit. They said at once that the results of the Fruit Marks Act had been most beneficial, but that apparently there were a number of packers who did not seem yet to have learned how to pack their fruit, as well as numerous producers and shippers. This indicated to me that our people still have something to learn. I do not believe that our growers and packers are dishonest or do not desire to live up to the provisions of the Act, but there is a great deal of carelessness, perhaps of ignorance and short-sightedness, among those who still neglect to grade and properly pack their fruit. I trust that the educational programme which has

been going on in regard to this will continue, and that the fruit growers themselves will do their best to continue the improvement. I have spoken frankly and freely to you. I appreciate the opportunity of coming before you. I want to congratulate you on the progress that has been made in your work, and I am sure that this Association and the various local Associations have contributed largely to that improvement and progress; but I want to impress upon you that you still have much to do, and I invite and ask your co-operation and assistance in carrying out that work. If you can point out legitimate work which we can do in the interest of fruit growing, it will be my duty and pleasure to endeavor to carry out those suggestions.

REPORT OF COMMITTEE ON CO-OPERATIVE ASSOCIATIONS.

By A. E. Sherrington, Chairman, Walkerton.

Mr. Sherrington: I am a stronger believer to-day in co-operation than ever I was, owing to the success that has been achieved by the associations now operating. We have three or four such associations which have been in active operation for the last two or three years or longer. This season we organized several others, and they are making a perfect success in the shipment of apples. Among the active associations, I may mention the ones at Forest, Chatham and Oakville. The latter was organized last spring in the form of a joint stock company, and it is handling all the apples in that district except those of one man, who, I believe, broke away. One of the difficulties we have to contend with in connection with this movement is that members are sometimes led away by a buyer who will offer them a few cents more per barrel for their fruit. We want more men like the President and Manager of the Forest Association, who was offered 25 cents over and above the amount which the Association was offering to its members, but who declined the offer, stating that his apples must go through the hands of the Association. As soon as these men find that we are determined to stand together this temptation will no longer be presented to us.

Q. Do you think that it is done with the deliberate intention of breaking up the organization?

Mr. Sherrington: I do not claim that this was so in my own case, but I have known of such instances occurring.

Clarksburg has organized a splendid association, and I understand that they have erected a storage building which is superior to anything of its kind in the Province. Other associations exist at St. Catharines, Burlington, and Burford. A number of others were organized, but, having no fruit this year in their locality, they did not do any business. This is also true to a large extent of the Associations at Owen Sound, Thedford, Parkhill and Ilderton. Our Association at Walkerton is still in good standing, but, as we had no fruit this year, we could do no business.

In connection with this work I think the time has come when an effort should be made to have representatives from these Associations attend the meetings of this convention without too much cost to themselves. I think that the movement is of the greatest importance to the fruit industry, and should receive a full recognition from this Association. I think the time has arrived when we should promote the work of organization more vigorously than ever, and, through these societies, get into closer touch with the wholesale and retail merchants in Great Britain.

A MEMBER: They should send their agents here and purchase f.o.b.

Mr. SHERRINGTON: They are doing so, and I explained to them, when over there this summer, that they could make more money by this method if they would provide storage over there for our apples.

After visiting all of the principal fruit markets in England and Scotland, I am more convinced than ever that co-operation among the growers and shippers of Canada and other countries is an absolute necessity if the growers are to retain that market and receive a share of the profits on the products of the orchard. I saw some dickering in Great Britain last summer that could scarcely be called square dealing, in fact, it was anything but square. Who was the loser in this particular transaction? No one but the shipper. The commission merchant had his commission and was at no loss. The time is coming when our fruit and other produce will be sold f.o.b. here, instead of by consignment.

Retail merchants I saw expressed themselves as very much pleased with our method of co-operation in packing apples, and agreed that all products should be sold direct, and not handled on commission.

I interviewed several retail fruiters in regard to shipping apples in boxes. A number of them had had no experience with boxes, but said they were willing to give them a trial, believing that they would be very convenient for their trade. Others who had handled apples in boxes were perfectly satisfied that it is the right package for the finer sorts.

During the short time that I was in Europe I had no difficulty in arranging with reliable parties to take all their requirements from our co-operative association f.o.b. here. If the right kind of man was over there one season he would be able to place nearly all the apples grown in Ontario by straight sales to reliable parties. It does not pay to send anything to Europe but first-class goods. When good fruit was offered the buyers vied with each other in bidding, but when the goods were inferior bidding was slow.

It is a great mistake to mark the barrels wrongly. I saw some apples on Covent Garden Market, London, put up at Colborne, Ont., marked XXX Duchess. I opened some of the barrels and found one marked XXX Duchess which had not a Duchess in the barrel. They were green apples without a particle of color. Another barrel contained Duchess, but only number two, and marked XXX. This kind of packing will not do. It can be prevented by co-operating in packing.

The need for greater co-operation on the part of Canadian growers becomes more apparent every year. Co-operation will mean better packing and higher prices, and will strengthen the fruit industry in all its branches. Wherever it has been given an honest trial in Ontario it has been a great success. The more of these associations we can have, the better for the growers of the province.

Mr. RICKARD: Does your Association pick the apples, or is the work done by the grower?

Mr. SHERRINGTON: The grower picks the fruit and brings it in.

Mr. RICKARD: We cannot get that done in our section.

Mr. SHERRINGTON: I do not understand why the buyer can get men to pick fruit while the grower cannot.

Mr. LICK: Why could not the co-operative association supply the labor? They could employ a gang of men and keep them regularly at work through the picking season, sending them from orchard to orchard. This, it appears to me, would be the most satisfactory and economical method.

Mr. Rickard: With us the buyer always picks the apples. He brings his men from a distance, as a rule, at any rate all the expert pickers. They get fifteen dollars a week, and their expenses at the hotel. This, of course, comes out of the pocket of the grower indirectly.

Mr. Sherrington: It is clear that the work of education will have to go on.

Mr. A. W. Peart, Burlington: We have several co-operative associations in my district. The one to which I belong has been in existence for twenty years, and comprises ten or twelve members. Every year we appoint a manager on salary. We hold a meeting at the beginning of the season, and adopt rules and regulations as to packing, to which each member subscribes. Each member has his name and address painted on his packages, and, in addition, we have a common brand. In this way his individuality is maintained. Our business is a box business entirely. We prefer boxes because we find that 99 per cent. of them reach the Old Country market in first-class condition, and we are not troubled with slacks or wets or anything of that kind, and, therefore, we obtain a better average price. I have accounts for two or three shipments made since Sept. 20. The first lot netted our shippers at the rate of $2.00 a barrel, after paying for picking, packing and transportation. This was the average for the lot, consisting partly of No. 1 and partly of No. 2 fruit. From another shipment, of which I received the returns a day or two ago, we averaged for our fruit 6d. per box more than the current market price.

D. Johnston, Forest, President of the Forest Co-operative Association: Our association has had a very successful season this year. In former years a great deal of our business was with the west, but this year we sold the crop to an English firm, which paid $2.50 for No. 1, and $2.00 for No. 2 f.o.b. Forest. The firm paid us spot cash, and we got along very nicely, indeed. In the spring it was decided that all members must spray their trees at least four times during the season, twice before blooming and twice after. Our experience of last season made it clear to us we must grow fruit successfully before we could co-operate successfully in selling it. We found that some of our members did not spray, or look after their orchards, and took no interest in them, nor in the success of the Association. This year we enacted a by-law compelling every man to spray his trees. The result was that members of the Association this year had a good crop of apples, while those men outside of the Association, who did not spray, had almost a failure. At present each member sprays his own trees, but I think that it will end in the work being done by co-operative methods before very long. So far as my own experience in spraying goes, I may say that we had become almost discouraged in fruit growing until we commenced spraying our orchards. In two or three years we increased our output by this means from 300 or 400 barrels of inferior fruit to 1,500 to 2,000 barrels, the greater part of which was first-class. This result has now been maintained for ten years without a single break.

Q. What would be the best method of co-operative spraying?

Mr. Johnson: The ideal system would be to have a power sprayer go from place to place. Personally, I have not had much experience with power sprayers. We use a hand pump, and get along very well. Last year we spent fourteen weeks in spraying our orchards, and this season the work occupied twelve weeks.

W. D. A. Ross, representing the Chatham Association: Our Association was organized nine years ago with a small beginning, and the member-

ship has now grown to seventy-five. We had a central packing house for four years. Before that, we had considerable trouble, and thought we should have to discontinue business. The Association has a power spraying outfit which has operated for two seasons. Although not compelled to do so by by-law, nearly all the members take advantage of it. The directors raise enough money early in the season to pay for the work, and each man's share is charged up to him, and deducted from the returns for his fruit. Spraying has easily doubled the value of the fruit. One man in our district has an orchard of 180 trees just coming into bearing. When we sent out our spraying circular in the spring, he thought that his crop was not worth attending to, estimating it at about fifty barrels. He finally decided to spray. A little later in the season he thought he might have a hundred barrels. He finally delivered 290 barrels of good apples.

Our method of handling the fruit is as follows: When a man brings his apples to the packing house we have a rubber stamp with his name on it, which is stamped on each case before it is packed, and his fruit is kept track of in that way. The culls are sent to the evaporator. We have a salesman of our own in the West, where most of our fruit is sent. This year, however, we sent some to Glasgow. The first shipment will net our growers about $2.00, and the second about $1.50. Some of the fancy lots brought as high as $3.75 per barrel.

PARIS GREEN AND ARSENICAL POISONS.

By Robt. Harcourt, Professor of Chemistry, Ontario Agricultural College, Guelph.

The absolute necessity of having some means of successfully combating the ravages of the potato beetle was responsible for the general introduction of Paris Green as an insecticide. When and by whom it was first used for this purpose does not appear to be known, but the use of Paris Green as a standard insecticide undoubtedly began in the Western States some time between 1860 and 1865. The fact that this substance was a poison, and that it injured the foliage, prevented its general acceptance at once, but these objections were soon overcome by the imperative demand for some means of destroying the beetle in order that potatoes might be successfully grown.

The success attending the use of Paris Green in destroying the potato beetle soon suggested its application to plants suffering from the attack of similar insects. In 1872 Riley suggested the treatment of cotton plants with Paris Green for the destruction of the Cotton Worm. The same year Le Baron, then State Entomologist of Illinois, advised the use of Paris Green in combating the canker worm of the apple. It was, however, some years later before the fruit growers in the Eastern States began to use this now well-known insecticide, and it was not until the early eighties that it was freely used by the orchardists in Ontario. As the composition and peculiarities of Paris Green became better understood, and the life history of insects and their manner of feeding has been studied out, the use of Paris Green and other arsenical poisons has become general, until at the present time hundreds of tons of these poisons are used annually in destroying the little but numerous enemies of the crops of the farm and garden.

Paris Green is composed of copper oxide, acetic acid, and arsenious oxide, combined as copper-aceto-arsenite in the following proportions:

Copper oxide	31.29	per cent.
Arsenious oxide	58.65	" "
Acetic acid	10.06	" "

Paris Green is not a chemically pure substance, and, as found on the market, rarely, if ever, consists entirely of pure copper-aceto-arsenite, but contains this compound as its chief constituent with varying quantities of other substances. The varying composition of Paris Green is usually due to variations in the care given to the details of the process of manufacture, the purity of the compounds from which it is made, and to whether or not foreign "make weight" substances have been added.

Among the small amount of impurities always present, sand, sodium sulphate, and uncombined arsenious acid are the most common. Barium sulphate, road dust, and calcium carbonate are sometimes used as adulterants. Fortunately, the presence of these substances is easily recognized by their insolubility in ammonia water. Paris Green itself completely dissolves in this liquid, giving an intensely blue-colored solution. This test, however, is not conclusive, since arsenious oxide is soluble in ammonia, and would escape detection if this method alone was depended upon. While total solubility in ammonia is scarcely to be looked for in a commercial article like Paris Green, the presence of any appreciable quantity affords valid grounds for rejecting a sample. According to the results of an examination of the genuineness of Paris Green sold in the Dominion in 1902 and 1903, reported in Bulletin No. 88, Inland Revenue Department, Ottawa, only 7 out of 169 samples examined were adulterated. From the figures given in this publication it would seem that an improvement has been taking place during the last ten years in the quality of Paris Green sold in the Dominion. The percentages of pure samples in previous collections were as follows:

1894	72.2	per cent. genuine.
1895	89.1	" " "
1902-3	95.8	" " "

Work in our own laboratory on samples collected directly from the country stores indicated a larger percentage of adulterated samples than the figures quoted above.

It is, however, to the presence of soluble arsenious oxide, to which the scorching properties of this insecticide is due, that the most attention is being paid at present. Several of the American States have passed laws limiting the amount of soluble arsenious acid in Paris Green. In California four per cent. is allowed; while New York's laws only permit 3.5 per cent. That there is a wide variation in the amount of water-soluble arsenious oxide is evident by the fact that in 22 samples examined at the Geneva Experiment Station, New York State, in 1900, the percentage amount of soluble arsenious oxide varied from .61 to 15.69, and averaged 1.68.

According to J. K. Haywood (Bulletin No. 82, Bureau of Chemistry, Washington), there may be three conditions of Paris Green which will cause a scorching of the foliage.

1. There may be a certain amount of arsenious oxide in the Paris Green over and above the amount combined with the other constituents.

This is "free" arsenious oxide, and, until recently, it has been considered the only cause of the scorching of the foliage by Paris Green.

2. The Paris Green may be poorly made, so that the constituents are very loosely held together. When such Paris Greens are put into water, especially water containing carbon dioxide, they are soon broken up, and arsenious oxide is set free. Even the best Paris Green breaks up under such conditions, but those poorly made break up much more rapidly. The effects of these substances upon the foliage would be somewhat as follows: First, the water of the spray would act at once on the Paris Green, and set arsenious oxide free, then carbon dioxide would dissolve in the water and carry the decomposition still further. But the breaking up would not end here, for the rain and dew, both containing carbon dioxide, would also act upon the Paris Green, and enough arsenious oxide would soon collect to seriously scorch the foliage. This would, of course, take place to some extent with the best samples of Paris Green, but, unless the climatic conditions were very adverse, not enough free arsenious oxide would accumulate at any one time to cause serious damage.

3. The Paris Green may be extremely fine. It is well known that even the best brands, when ground to a very fine powder and applied to the foliage, may scorch. This is, doubtless, due to the fact that more surface is exposed to the action of the water, which may contain carbon dioxide, so that its decomposing action on the Paris Green is accelerated, and enough free arsenious oxide soon gathers to cause serious damage.

It is a very common occurrence for Paris Green to scorch the leaf owing to one of the first two causes, i.e., either by reason of the presence of free arsenious oxide, or, because it is poorly manufactured; but it is very seldom that a commercial sample of Paris Green will burn, because it is in too fine a condition.

As is well known, the object in adding lime to Paris Green, before spraying, is to neutralize this free arsenious acid, or that formed by the decomposition of the Green in the water.

The best Paris Green is a powder composed of crystalline globules of microscopic fineness. Unless the particles are fine enough to pass through a 100-mesh sieve, the Green should be condemned as unfit for spraying purposes; for, if the particles are larger, there is no chance for an even distribution of the poison. The aggregation of globules is probably due to careless grinding and bolting, or, possibly, due to the after treatment to remove impurities. In drying from this operation, the globules cohere and form strings and bunches of particles which are sometimes found also to be bound together by crystals of uncombined white arsenic.

During the last summer six samples were sent to us for analysis. These samples were all of good quality, for they were not adulterated, and contained only small amounts of soluble arsenic.

According to experiments conducted with Paris Green of known composition, the various kinds of fruit trees show great differences in their ability to resist the burning or scorching action of the arsenious acid from the Paris Green. The apple tree is, apparently, the most resistent, and the peach the least. It is, however, equally true that the same trees are not always equally proof against the burning action of Paris Green. Weather conditions have a very marked influence. If, after the spraying there comes a long, dry period during which the dew and carbon dioxide

of the air have been acting on the Paris Green, the first heavy rain is likely to be followed by a burning of the foliage. This is due to the water taking into solution the arsenious oxide which has been accumulated during the dry weather. If, however, there is plenty of lime on the leaf, the acid will be neutralized as fast as formed, and the scorching will be prevented.

It is, therefore, evident that Paris Green varies in composition, and in the readiness with which it is decomposed, that fruit trees vary in their ability to resist the acid found and formed in Paris Green, and that weather conditions may cause a very marked difference in the amount of arsenious oxide which may come into solution.

From time to time, during the last fifteen years, experimenters have claimed that Paris Green has considerable value as a fungicide. This claim is again advanced in Bulletin No. 267, Geneva Experiment Station, New York, where it is claimed that the Paris Green materially checked the potato blight, and, thereby, increased the yield at the rate of 46 bushels per acre. The figures quoted in this bulletin would give Paris Green a fungicidal value equal to about one-third that of Bordeaux mixture.

Regarding the character and value of some of the latest commercial substitutes for Paris Green, it may be stated that many of them depend upon Paris Green for their poison, and that some of them contain very little of this or any other poison. One brand recently examined in our laboratory was found to contain only about half of one per cent. of arsenious oxide, and others contained arsenious oxide and copper equivalent to from one to five per cent. of Paris Green. Gypsum, lime, sand and charcoal are prominent constituents of these mixtures. Laurel Green, and the various Arsenoids contain more arsenious oxide than the class just mentioned. But, while these substances may be bought for less money and may be held in suspension somewhat better than Paris Green, many of them contain an unsafe amount of soluble arsenious oxide, and are thus liable to do much harm to the foliage. The Pink Arsenoid, or lead arsenite, should, possibly, not be included in this latter statement, as some experimental work goes to show that it contains only a small amount of uncombined arsenious acid, and that it is no more dangerous to foliage than Paris Green.

Regarding home-made arsenicals, there seems to be no good reason why these may not be used in all places in spraying where arsenicals are employed. They are cheap, easily made, and answer well in spraying, as they are not hard to keep in suspension. Further, the lead arsenite and arsenate are among the most insoluble of all combinations of arsenic and metals, and are, therefore, not liable to burn the foliage.

The formula for making one pound of lead arsenate, i.e., enough for from 100 to 150 gallons of water, is to dissolve 24 ounces of acetate of lead (sugar of lead) in one gallon of water; also, separately, 10 ounces of arsenate of soda in three quarts of water; both in wooden pails. The separate solutions may then be poured together into the spray tank filled with water. A white precipitate of lead arsenate immediately forms, and will remain in suspension for hours. The preparations may be made several times stronger without the least danger of producing any injury to foliage.

Both the "Arsenic and Lime" and the "Arsenic, Soda and Lime" preparations are now used. In both preparations the arsenic is held as insoluble calcium arsenite. The essential difference in the two methods is that in the former the lime and arsenic are boiled together until combination takes place, while, in the latter, the white arsenic is first dissolved in sodium

carbonate, so that when lime is added, combination takes place at once. As arsenite of soda will burn and destroy foliage, it should never be used without adding lime. Recently Lime Bordeaux has been used with arsenite of soda with good results.

In conclusion, it may be pointed out that mixtures of Paris Green, or home-made arsenicals, with either lime or soda Bordeaux, should not be made until it is ascertained that no harmful re-solution of the various ingredients is brought about thereby.

THE CANADIAN TARIFF ON FRUITS.

By W. L. Smith, "Weekly Sun," Toronto.

The subject that I am to speak upon this evening is one regarding which I have very strong convictions, convictions which have been based on a somewhat careful study of the facts and on the very best judgment that I have been able to bring to bear. I wish, first, to make a strong appeal to the members of this Association not to divorce themselves as fruit growers from the general farmers of the Province. I do not think you can afford to take a different stand on tariff matters to that taken by your fellow farmers engaged in general mixed farming. One thing it seems to me has been made perfectly clear, which is, that, so far as general farming is concerned, the tariff is of no benefit as a means of protection. Facts brought before the Tariff Commission prove that you cannot increase the selling price of the products of the farm by any tariff you may impose, for the reason that in the foreign market the price is governed by supply and demand, while in the home market we do not need protection for the reason that American prices are higher in all instances save that of hogs.

On the other hand, while the farmer cannot be benefited by tariff protection, he can be and is heavily burdened by the tariff on everything he has to buy. A convincing argument was presented by Mr. E. C. Drury, of Crown Hill, before the Tariff Commission recently, proving this to be a fact. He took his figures not at haphazard but from the actual expense account of his brother-in-law who is living on a 208 acre-farm, and showed that his expenses were increased annually by $180 because of the tariff on the articles purchased. The situation in which the general farmer finds himself therefore is that, while the tariff cannot increase the value of his products, it results in largely increasing the cost of everything he has to buy. I therefore appeal to you as fruit growers not to take a stand on this question which will place you in opposition to the general farming interests. If you ask for protection on your particular class of products, the manufacturer will certainly use it as an argument in favor of further protection for the articles he manufactures, with the result that he will take a still heavier toll from the general farmer. But even so far as fruit growing is concerned, I do not think you have anything to gain by increased protection. It does not appear to me that Californian fruits, for instance, compete in this market with our own products to any great extent. I do not think that any one would go so far as to shut out fruits which we either cannot produce, or which come upon the market earlier in the season than our own. I claim that there is no real competition between the Canadian and American producers of fruit in this market. During the past season, for instance, similar fruits were selling higher in the American market than they

were here with the exception of pears, and so far as they are concerned, the facts are that we had a comparatively small crop while they had a very large one. This might have been offset by the exportation of peaches to the United States if our growers had been alive to the facts as they had a short crop while we had an abundant one. Unfortuately the opportunity was overlooked. It is true that tender fruits come in from the South in considerable volume in the spring, but they come in at a time when you have none to offer, so that they do not compete. Just as soon as our own fruit is ripe, the American fruit disappears from the market because of the superior quality of the home grown article. The American fruit must be picked long before it is mature because of the long distance it has to be transported, and it cannot be placed upon the market in as good condition as our own freshly picked fruits. I contend therefore that the tariff will not increase the price of your fruit, but just as in the case of your brother farmers, it does materially increase the price of what you have to buy. Everything that comes into your household must be dearer by reason of the tariff but the fruit farmer is subjected to special burdens in this connection. One of the biggest items of expense in connection with fruit growing is for baskets in which to ship the fruit. Baskets brought into this country are taxed 30 per cent. on their value. There was a case less than three summers ago when elm timber was taken from this Province to the United States and manufactured into baskets which were brought back here and sold in the face of the duty. During the past season one of the Niagara growers paid $300 more for his baskets than he would have paid if there had been no tariff on this article. Mr. Hilborn, one of your members tells me that he had occasion to purchase a certain make of wagon on the other side, which he could not buy in Ontario. The duty on such articles is twenty-five per cent., but in this instance the tariff does not show on the face of it the full tax imposed because, although he paid only $30 for the wagon, it was valued by the custom authorities at $40 and the tax on it amounted to $10, the ruling being that a general valuation of $40 was to be placed on all vehicles imported, no matter what their value.

Perhaps the most serious tax so far as fruit growing is concerned is the one on sugar. There is a very intimate relation between practical fruit growing and the price of sugar in this country. First because the price of sugar largely determines the quantity of fruit the Canadian housewife puts up for winter use and second, because it has an important bearing on the business of commercial fruit canning. One of our largest canners told me recently that one good crop of tender fruit from this Province would be sufficient to supply the whole of Canada with canned fruits for a period of two complete years. It is necessary that this surplus crop should be disposed of in some way before the next season's crop comes upon the market. If it cannot be consumed by the home market, it must be disposed of in the foreign market. The tariff on sugar directly affects the cost of producing canned fruits, and it is here that the situation is fraught with considerable danger to the grower. It is clearly essential for the welfare of the fruit industry that the export trade in canned fruits should be built up. The value of our exports of canned fruits ought to be equal to the value of our exports of fresh fruits. One of the greatest difficulties in the way of building up this business is the excessive cost of sugar. I am told by canners that the cost of sugar represents one-third of the selling price of canned goods. A tax of 46 per cent. on refined sugar coming into this country is a very serious handicap to this business. When this matter was brought to the attention of the Tariff Commission, it was suggested that a rebate might be arranged on sugar used in

the canning of fruits for the export trade. But aside from the impracticability of such a scheme, it would certainly work a great injustice to the Canadian consumer.

It should be pointed out that when the statement was made that one full crop would supply the market with canned fruits for two years, it was on the assumption that the rate of consumption remained stationary. There is no reason why this should be the case. There is no reason why we should not consume double the amount we are doing, and the way that this might be brought about is to reduce the price of the sugar that enters into the article manufactured for home consumption, thus reducing the market price of that article. I remember that, some years ago, after the price of sugar had been very high, it was suddenly reduced by one-half. I was living in Toronto at the time, and I know that practically every person of my acquaintance put up double the amount of canned fruit that season that they had done formerly. The inference is obvious that if the cost of sugar is still further reduced, the consumption of fruit will be increased enormously.

Sugar should be cheap for the reason that it can be produced so cheaply in cane-growing countries. I obtained the official report in regard to sugar statistics from Washington. In that report it was shown that with raw sugar at 1½ cents per pound, there would still be left a fair profit to the Cuban sugar planter. The statement was made in Montreal before the Tariff Commission that American refiners charged a difference of about ¾ of a cent per pound between the raw and the refined article, that is to say, they charged ¾ of a cent for refining. If therefore the raw sugar can be purchased at a cent and a half it could be put on the market at a little over 2½ cents and sold retail at 3 cents, which is what we should have. With sugar at that price you would double the consumption of fruit in this country. In my judgment, and in that of many practical farmers, the establishment of the beet sugar industry in this Province was one of the greatest mistakes that could have been made. It cannot thrive, except it be protected by high tariff or is very heavily bonused. I am told by men in the business that beet sugar cannot be produced profitably unless it can be sold wholesale at 4 cents per pound but cane sugar can be sold at 3 cents a pound retail. Think what this difference means to the Canadian consumer. The policy of the fruit growers, it appears to me, should not be to ask for more protection on their finished products, but to ask for cheaper sugar so as to increase consumption with a corresponding increase in their output. Cheap sugar should be their watchword. With cheap sugar the fruit growing and canning industries would be two of the largest labor-employing industries in the country. I know of nothing that would do more for unskilled labor.

My conclusions briefly stated, are these: I do not think it is possible for you to increase by any tariff the selling price of your fruit; that the present tariff is a very heavy burden on the farmers and a still heavier burden on the fruit growers, and I urge you to stand by your brother farmers in demanding a lower tariff on the goods you have to purchose. No Government can stand against your united request.

Mr. Rice, Michigan: The tariff on sugar is one of the greatest curses we have in the United States. The Havemeyer Company has become so strong in our country that they very largely control the Government. The protection offered the sugar, steel, and other combines is one of the greatest curses we have. I belong to the Republican party, but I maintain that we have made some awful mistakes in this connection. As to beet sugar, there is not a women in my neighborhood who will use it in putting up fruit. You cannot protect an industry in that way without making the men at the

head of it rich, and at the same time mean. They get the notion of living off the people and cannot do otherwise. Just as soon as they see the chance to put their hands into the people's pocket, they will do it.

Mr. H. W. Dawson, Commission Merchant, Toronto; There seems to be an impression that a greater quantity of fruit and vegetables was imported from the United States than was actually the case. Our exports to the United States were a hundred per cent. greater than our imports. Last year Toronto imported 420 barrels of apples. There were twenty men in Toronto who each exported more than that to the United States in one week. A high tariff against strawberries would be a mistake. The importation of early strawberries starts consumption going and broadens the market for the native fruit when it comes in. During the last two or three years the price of berries has been good on the average and they were a paying commodity. The same arguments apply to other fruits. The trade returns show that during the months our peaches were on the market the importation of American peaches was not heavy, the heaviest importation being in July, August and September; during October hardly any, and none at all in November. The total importation to Toronto last year was $11,000 worth, which was not much of a factor in a city of its size, as the consumption would average more than that per week in the season. Montreal imports more Californian fruit than Toronto, but that city is the distributing point for the east. I also maintain that an agitation for reduced freight and reduced express rates would do more for the industry than an increased tariff, as it would result in widening the market. What is required is a specified duty wherever possible, as great opportunities exist in the fruit and vegetable industry to understate valuation in making customs entries. The cost of the vegetables placed on the cars is frequently sworn to as being the value of the goods.

Mr. J. L. Hilborn pointed out that the manufacturer had an increased tariff already, and for the fruit and vegetable growers to ask for more protection was no reason why the manufacturer should do the same. He had been obliged to buy certain implements and appliances in the United States and pay the duty, but when he came to sell his products in order to pay for these goods, he found that the market was crowded with cheap American stuff which had paid very little duty. As to peaches if there were no protective duty, American peaches, under the conditions of transportation referred to by Mr. Dawson, could be laid down here far cheaper than our own. Cucumbers from the South were placed upon our markets in large quantities. When they arrived they were yellow and wilted and in many cases unfit for food, but they were so cheap that many people bought them instead of the superior article supplied by local growers.

Mr. Armstrong stated that he wished to take issue with one of the statements made by Mr. Smith, namely, that as soon as the Canadian product reached the market, importation from the United States ceased. On the 4th of August two carloads of tomatoes which had been consigned to Buffalo, but met with a glut in the market, were dumped into Toronto and auctioned off at 25 to 40 cents a bushel. The local growers were receiving from 40 to 50 cents per bushel at the time. Immediately after this occurrence tomatoes dropped to 25 cents and never went above it. He had personally investigated conditions in Montreal on two occasions and found that at the time of his visit, which was early in October, the Californian peach was practically the only peach upon that market, and it was much the same with some other fruits. In reply to his enquiry as to why Canadian peaches and grapes were not to be found there, he was informed that Californian fruit

stood up better and looked better. Its quality was a secondary consideration. He was willing to allow the Canadian consumer to get all the American fruit and vegetables he required free of duty up to a certain date provided that when our own fruit came in, the American product was entirely shut out of the market and the market left for Canadians.

Mr. Dawson said he remembered the day the second car of tomatoes arrived from the United States. It was a Monday morning. On the following Tuesday the local shipments were ten times greater than on any day up to that time, but the growers received from 40 to 60 cents for them, whereas the American fruit realized from 25 to 50 cents. A good home grown article, he contended, would always command a good price. Foreign fruit that had been for eight to ten days in a refrigerator car could not compete with it.

A representative of the vegetable growers stated that their desire for a high tariff was in order to shut out inferior products. A higher tariff would mean that only superior vegetables would be shipped to this market. There was no objection to the importation of American vegetables so long as they came in ahead of the home product. But there were men in Ontario who were able to produce vegetables all the year round which were nearly as cheap and of better quality.

Mr. Dawson said that peaches could be bought in Michigan and laid down here, and the duty and freight combined was less than the freight alone from any of the peach growing districts in Ontario.

Mr. W. H. Bunting thought there was a strain of selfishness in human nature, and he did not claim that fruit growers were exempt from it. He had listened to Mr. Smith's able address, and assumed that this was simply a discussion of the principles underlying the question. As fruit growers they found themselves between the upper and the nether millstones as regards the tariff. When they had a surplus to send to the United States, they found themselves practically prohibited from that market. If they had anything to buy in the way of implements, packages, and appliances, the Canadian duty had to be faced. He did not wish to raise the sympathetic cry on behalf of the fruit growers, but, nevertheless, it was nothing but the truth to say that they were still further handicapped by climatic conditions, the season in this country being so much shorter than in the country to the south. One of these obstacles might be endured, but a threefold handicap made it necessary to rise in self-defence. He did not think, however, that the representatives of the fruit interests were ready to go before the Tariff Commission and ask, like the manufacturers, for a large increase in the tariff. His personal view was that the large majority were willing to allow matters to remain almost as they were for the present, but at the same time they were prepared to protest very vigorously against increased protection for the manufacturer.

Mr. Dawson had made the statement that there are more apples shipped to the other side of the line during one week than are imported in the entire year. Granting that the statement is correct, let us suppose for the sake of argument that 100,000 barrels of apples were sent to the other side from our orchards during the present season. There is a duty of 69 cents per barrel on that product. Who, I ask, pays that duty? The American consumer or the Canadian producer? If I am any judge of the matter, I believe the Canadian producer pays it. If Mr. Dawson exports apples to the United States, he does so because he knows that the market, say at New York, is at a stated figure, and he must make his purchase here at 69 cents a barrel less than

would be the case if free traffic to the other side existed, consequently the producer pays the duty.

Mr. DAWSON: They pay me the same price f.o.b. here as what we get shipping to Great Britain.

Mr. BUNTING: These people would pay 69 cents a barrel more for that fruit if they had not to allow for the duty.

Mr. TWEDDLE suggested that highly protected industries were able to pay labor such a high rate of wage that the farmer, not being able to pay as much, could not secure the assistance he required.

Mr. SMITH, replying to Mr. Armstrong, stated that the total amount of plums and peaches combined that came into this country last year amounted to only $107,000 worth. Our exports of berries alone amounted to $120,000 worth. As to tomatoes, $103,000 worth were imported, while the potatoes exported to the United States were valued at seven times that amount. He considered, therefore, that there were two sides to the question. As to Mr. Hilborn's contention that a higher tariff on fruit would have no effect on the manufacturer, he stated that the manufacturers had been trying for years to get the farmers to ask for more protection so that they might use this argument as a lever. The demand for more protection on the part of the horticultural interests would alienate the sympathy of the general farming community and prevent co-operation.

Mr. BUNTING stated that he had observed by the day's newspapers that the retail merchants of Toronto had appeared before the Commission asking for a very marked reduction of the tariff on fruit coming into Canada, and he thought it incumbent on the Association to take some action in the matter. The majority of the fruit growers were, he believed, satisfied with the present duty. What they did object to was that some products were allowed to enter at a nominal valuation on the *ad valorem* basis and thus escape practically any duty. "A consignment of pears came to my own town from Delaware a week or two ago. They were entered at a nominal valuation for custom purposes, and came directly into competition with the crop in our own section. This is a case where the duty is ineffective, and I think the growers would like a specific duty substituted for the *ad valorem* duty."

Mr. ARMSTRONG suggested that the only way to relieve the situation was to prevent the dumping of fruit on the Canadian market. He doubted whether a specific duty would meet the case. This was a matter that had irritated the growers during the past season more than anything else he knew of.

Mr. BUNTING then moved "That the Fruit Growers' Association of Ontario in convention assembled would respectfully urge on the Tariff Commission that it would be disastrous to the fruit industry of this country, if any reduction was made in the duties on fruit coming into this country from foreign ports, and that while the duties upon fruit exported to the United States are in many cases prohibitory, the fruit growers of this country do not ask for any increase in the tariff, but would request that wherever possible specific duties be substituted for *ad valorem*.

"That this Association believes it desirable and in the interests of the fruit industry, and the general public of this country, that the Tariff Commission should recommend a reduction in the duty on refined sugar imported from foreign countries."

Mr. HAYNES seconded the resolution, and suggested that a Committee be appointed to present same to the Tariff Commission. (Carried.)

The President named the following Committee:—Messrs. Bunting, Johnson, Peart, Thompson and Race.

REPORT OF NOMINATING COMMITTEE.

The Report of the Nominating Committee was presented by Mr. M. Pettit of Winona, who moved its adoption, seconded by Mr. T. H. Race, of Mitchell.

It was moved in amendment by Mr. Bunting, seconded by Mr. Thompson, that the names of the directors be taken up district by district. (Carried.)

Mr. Thompson moved, seconded by Mr. Andrew Haynes, that C. W. Vanduzer of Grimsby be reappointed director for division No. 8, instead of E. Morris, of Fonthill, the nominee of the Committee. The amendment was declared lost, and the motion to adopt the report was carried.

A special committee consisting of A. W. Peart, M. Pettit, and A. E. Sherrington, appointed to consider the interpretation to be placed on rule 10, of the Prize List, reported as follows:

"Your Committee recommends that the interpretation of rule 10 be left in the hands of the Executive and the interested exhibitors. Your Committee is of opinion that this is a matter which concerns these two parties only, and that it would be a waste of the time of the meeting to discuss it here."

PRESENTATION TO MR. W. H. BUNTING.

Mr. Alex. McNeill: Before taking up the report of the nominating committee, I wish to ask your attention to the reading of an address to Mr. W. H. Bunting, in which we have endeavored to convey in appropriate terms the high appreciation of the very valuable work he has been able to accomplish for the fruit growers in connection with transportation and other matters. None but those who have been officially associated with him can appreciate how much he has actually done, and I am sure you will agree that the address by no means overstates the facts of the case.

W. H. Bunting, Esq., Honorary President, Fruit Growers' Association of Ontario:

Sir,—We, the members of the Fruit Growers' Association of Ontario, assembled in Annual Convention, cannot allow the Annual Meeting of 1905 to pass by without recognizing in some way the splendid services that you have rendered through your official connection with the Fruit Growers' Association, not only to the members of the Association, but to every fruit grower in the Province. As President for the years 1903 and 1904, and Chairman of the Transportation Committee, you have been untiring in your efforts to secure for us some relief from the burdens imposed upon us by the transportation companies. The compliment extended to you by the Chairman of the Railway Commission, on your magnificent presentation of the fruit growers' case before the Commission in June, last year, was appreciated by the members everywhere, and we desire now to add our words of congratulation on the beneficial results that have followed your efforts.

We trust that you will long be spared to continue the good work which you have so well begun, and that, through your close connection with the fruit industry, you may with many others reap the reward of your labors in the improved transportation facilities and rates, which have resulted largely from your own exertions.

As an officer of the Association during the past four years you have voluntarily given up a great deal of your time to the furthering of the general interests of the Association. Several important schemes for the betterment

of the lot of the fruit growers have been carried out during these years, and many others have been begun at your suggestion. Your good judgment and business-like methods while acting as chairman of our meetings have won for you the highest praise, and we desire to express at this time our most sincere acknowledgment of the untiring zeal with which you have labored on behalf of the fruit growers of Ontario.

In conclusion, we wish once again to thank and to compliment you upon the success which you have achieved in and for the fruit industry, and trust that you may live to see the efforts which you have put forth on behalf of this Association crowned with unparalleled success.

Signed on behalf of the Officers, Directors and Members of the Fruit Growers' Association of Ontario.

ALEX MCNEILL, President.
November 16, 1905. P. W. HODGETTS, Secretary.

Mr. W. H. BUNTING: I thank you, gentlemen, for the very kind expressions contained in the address which has just been read. It comes to me as a complete surprise and I feel myself quite incapable of expressing in words how much I value the appreciative statements it contains. I trust that I may be enabled in the future to join with you in your efforts to still further promote the welfare of the fruit growing industry.

REPORT OF COMMITTEE ON PACKAGES.

PRESENTED BY ROBT. THOMPSON, ST. CATHARINES.

Your Committee beg leave to report as follows: That the eleven quart basket has been found satisfactory as to size, etc.; that the law in regard to the 6⅔ quart basket be amended to read 5½ quart, and that the regulations regarding uniform dimensions as to depth, length and breadth and top and bottom measurements be made imperative on the manufacturers placing baskets on the market.

That the Association take steps to secure information as to best package to be used for carriers, for fancy fruit, for long distance shipment; also as to a suitable package for pears, the present standard package not being satisfactory.

Your Committee further recommends that barrels be made entirely of the 28½ inch stave, with a capacity of 96 quarts, instead of the two sizes now used.

The reason for desiring uniformity in the different makes of baskets is because in loading a car it is found very difficult to pack different sizes and shapes together. The reason for the suggested change in the size of the smaller basket is that we find that, with the exception of one or two factories, the 6⅔ quart basket is no longer made, and that the 5½ quart has taken its place.

Major SHEPPARD: We have five different makes of basket in our section, every one of different size. What is required is that the dimensions of the standard baskets should be made uniform.

Mr. EATON: I quite agree that it would be a desirable thing to have baskets of a uniform shape, size and make, and am quite sure that the manufacturers are perfectly willing to do whatever is required of them by the growers.

A Basket Manufacturer: I do not suppose that manufacturers would object if they were compelled by law to keep to standard sizes, but I do not see what there is to prevent the consumer using imported baskets that do not conform to the requirements. I quite concur in the recommendation of the report that these packages should be made uniform. The tendency has been that the manufacturer who produces the smaller basket gets the trade. That is not right, and the law, whatever it is, should be enforced.

Mr. Everist: I would advocate that the Minister of Agriculture should bring in a law regulating the size of fruit packages, but my idea is that such a law should go still farther and stipulate the number of quarts a package should hold. I am very much in favor of the passing of a law compelling every manufacturer to make peach, plum and grape baskets uniform in size in all particulars. Then, if in compliance with the specific requirements of customers for special markets, other sizes are manufactured, compel him to put on the outside of the package in quarts just how much the package holds. Then the purchaser or shipper knows exactly what he is getting. As to undersized baskets I am disposed to lay the blame on the grower or shipper, as the manufacturer is only seeking custom and is willing to make what his customer wants.

Mr. Ford: We are trying to conform to the law in regard to the sizes of baskets, and in my opinion the grower is to blame for baskets being under size, as they want a small-sized basket so as to get the better of their neighbor in shipping fruit. If one manufacturer will not supply what they want they go to another. In my opinion the basket should be long enough on the top so that you can cross four and they do not dip in. They should also have a first-class cover; some are not up to the mark in this respect; and should be of a standard size throughout.

Major Sheppard: As to the responsibility for the small basket, I find that basket agents go around and by packing a basket, show the grower that he can save four to six peaches in every basket by using that particular make. This has been done all over the country.

Mr. Haynes: With reference to the package for pears, I may say that I saw the expert packer from British Columbia packing the fruit, and after he had shown what he could do with apples and pears in certain boxes, I asked him to pack a basket for us. After spending half an hour in a vain attempt he had to throw it up. In his opinion, while it might be a satisfactory package for peaches, apples or plums, it was altogether unsuitable for pears. I think this is on account of the flare in the basket. The baskets made by some factories have altogether too much flare.

A Manufacturer: In my experience I have found the eleven quart basket a very popular one. It is well proportioned and gives good satisfaction in our district. We went to great expense in changing our forms and dies in order to manufacture the $6\frac{2}{3}$ quart basket, and afterwards found that we could not sell it in competition with the smaller American basket. I will admit that since then we have been violating the law. I think it would be well if the Association would form a committee which would secure samples of all the different makes of baskets. Hardly any two manufacturers use the same forms and each will contend that his is the best because he does not want to go to the expense of changing his forms and dies. Your Committee could then decide as to the best shapes and sizes, and the manufacturers would govern themselves accordingly.

Mr. Carey: I was entrusted with the work of investigating the different makes of baskets. I visited nearly all the factories, and found that the reputed eleven quart basket ranged from nine to thirteen quarts in capacity.

All but four manufacturers were making them large enough or too large. The use of the thirteen quart basket was a greater hardship to the grower than the 10½ quart basket was to the consumer. I am in favor of each manufacturer being furnished by the Committee with the exact dimensions of the approved size, and that the inspection be of the pattern used, rather than of the output. This would very much reduce the work of inspection. I am in favor of the Committee deciding on dimensions and having every manufacturer adopt them.

The Chairman suggested that this point be referred to the Committee that was to meet that afternoon with the manufacturers.

Mr. Benning: In regard to the half pear case, I have been using it this year with very satisfactory results. I find no trouble in filling the case with any sized pear, except it be one of very large size, such as the Duchess. It is also uniform with the apple case, being the same in length and width.

Mr. Thompson maintained that pears could not be properly packed in the present half cases, and stated that this fact was demonstrated by fruit on exhibition at the Show, which had not received first prize simply because it was impossible to pack it satisfactorily. If we are to ship our fruit to the western markets we must adopt the size of box in general use in those markets, and give the buyer and the merchant what they want and are willing to pay more for. Your Committee did not feel like recommending any particular size of box until more information was gained. He suggested that this point be referred to the Committee also.

The question of the most desirable length of barrel stave was then discussed. The present law requires as a minimum size a 28½ inch stave, whereas the ordinary Ontario barrel has a 30 inch stave. Mr. Sherrington stated that during his visit to Great Britain, merchants had advised against changing the size of the Ontario barrel, as they claim to prefer it to the Nova Scotia or the American barrel. He further stated that the Ontario barrel was well known there, and had the preference in all the markets and that buyers would pay more for it.

Mr. Innis was of the opinion that the 30 inch barrel although it held two quarts more fruit did not bring a penny more than the twenty-eight and one-half inch in the English market. He claimed that a 28½ inch barrel of the proper build, so that it would not crush in, was the best one that could be obtained, and would bring just as much as the larger size. He further took exception to the statement that more was paid for the Ontario barrel than for the Nova Scotia.

Mr. Carey stated that his observation was that the Ontario barrel brought from one to two shillings more. He did not consider there was this difference in reality, but that when the two barrels were placed side by side the difference appeared to be greater than it really was. He stated that he had done everything he could to discourage the use of small barrels in Ontario, and thought that one or the other should be uniformly adopted.

Mr. Innis suggested that the small barrel quoted at one or two shillings less was what was known as the West Virginia barrel with a 16½ inch head and a 27½ inch stave.

Mr. Wilson, of Seaforth, was of the opinion that the old country merchant would not pay as much for the small barrel as for the larger one.

Mr. Caston thought that a barrel 19 inches across the bilge, 17 across the head, and a 30 inch stave was about right. He objected to too much bilge as when such barrels where packed in tiers those at the bottom were severely squeezed.

Mr. SHERRINGTON also advocated the smaller proportion of bilge. He thought that four hoops would be an improvement as they protected the fruit in the event of the barrels being rolled, which, however, should never be permitted.

Mr. RUDDICK pointed out that the present law was passed on the recommendation of the fruit growers, and that it was not likely that the Government would decide to change it without some very important improvement was to be had. He did not know whether the intention was to instruct the Association's delegates to the Ottawa conference to take some action in this regard, or whether it was merely a discussion to ascertain the opinion of the members of the Association. When it came to the question of barrels the Nova Scotia men had to be considered, and they were very hard to convince on some of these points.

On motion it was decided to refer the matter to the consideration of a committee to be appointed before the close of the session.

REPORT OF COMMITTEE ON MARKETS AND MARKETING.

Your Committee on Markets and Marketing beg leave to report that we recommend this Association to press upon the Dominion Conference of Fruit Growers for a vigorous campaign in conjunction with the Dominion Government to exploit the apple markets of Europe, Great Britain and South Africa.

To appoint agents whose sole duties will be to open up markets in these countries. To ask the Government to continue to improve the conditions of cold storage for tender fruits, so that the shipper may have the best facilities for reaching the markets of the world.

REPORT OF THE RESOLUTION COMMITTEE.

To the Officers and Members of the Ontario Fruit Growers' Convention.

Your Committee on Resolutions beg to submit the following:—

(1) That Messrs. McNeill, Race, Woolverton, Groff, and Dempsey be appointed a Standing Historical Committee. That it be the duty of this Committee

(a) To prepare as occasion arises, for publication in the annual reports of the Associations, sketches of the life work of those who have rendered distinguished services to the cause of Horticulture.

(b) To provide for the erection of suitable tablets to mark the place of origin of varieties of fruits, which have proved of special value.

(c) To prepare for our next annual report, a biographical sketch of the late D. W. Beadle, who during his life distinguished himself as a fruit grower, nurseryman, editor of *The Canadian Horticulturist*, and officer in the Fruit Growers' Association.

(d) To prepare a life sketch of our esteemed member, A. M. Smith, the father of the commercial peach-growing industry of Ontario.

(e) To arrange for the erection of a tablet marking the site on which the original McIntosh Red apple still stands, and that whereon the first Windsor Cherry tree sprang into life, grew and died. Carried.

(2) That we express our most sincere appreciation of the value of the work done during the past season by the Fruit Division of the Dominion Department of Agriculture in arranging for the publication, at frequent

intervals, while the growing season was on, of reports upon the fruit crop prospects as they appeared from time to time. We trust this system of crop reporting will be continued and extended as the effect of it is to place the rank and file of producers, so far as regards knowledge of the situation, on a footing of comparative equality with those to whom they sell.

Mr. SHERRINGTON: I have found these reports of great value to me. I govern my sales and prices in accordance with the information they contain. They were particularly valuable to me this year on account of the short apple crop.

Mr. MCNEILL: The reports are compiled from the returns made by about five thousand correspondents, and in these reports I have tried to present a consensus of the opinion given. Not a hint of the nature of the information gained is given out until such time as the whole becomes public property and the dealer and producer receive it at the same time. I feel that this work should be supplemented by the statistical departments of the Provincial Governments, as it is desirable that the producer should be put in possession of absolutely accurate and early information regarding the crop. The resolution then carried.

(3) That we desire also to congratulate the Dominion Department of Agriculture on arranging for informal but effective supervision of the work of transferring fruit shipments from rail to steamer at Montreal. This work, so well done, has been of inestimable benefit to fruit growers in preventing serious loss by damage in course of transit. Carried.

(4) That we desire to put on record an expression of our thanks to the railway companies for the courtesy which they have shown to the representatives of this Association from time to time and for the earnest effort they have made, during this year, to provide an improved service in the carriage of our perishable fruits. Carried.

(5) That it be a specific instruction to the delegates, who go from this Association to the Dominion Fruit Conference, to be held in Ottawa early next year, to bring before that Conference the desirability of securing at the forthcoming session of Parliament, legislation, under which express rates will be placed within the control of the Railway Commission, and that our delegates to said Conference be urged to endeavor to arrange for a deputation from the whole Conference to wait upon the Government, to urge the adoption of that which is herein recommended. Carried.

(6) That our delegates to said Conference be urged to bring before the body to which they are accredited, the desirability of securing legislation under which provision will be made that will insure just returns from the commission men for the fruit consigned to their care. Carried.

(7) That the Executive of this Association be instructed to wait upon the proper railway officials with a view of securing the privilege, now accorded other agricultural societies, of free return tickets from our annual convention without regard to the number in attendance. Carried.

(8) That the thanks of this Association be tendered to those organizations which have sent delegates to the present Convention. Among these organizations being Quebec Pomological Society, represented by Norman E. Jack; Michigan Horticultural Society, represented by L. B. Rice; Woodstock Horticultural Society, represented by J. S. Scarff; Chatham Co-operative Fruit Growers' Association, represented by W. D. A. Ross; Forest Co-operative Association, represented by D. Johnson; Orillia Horticultural Society, represented by C. L. Stephens, and Burlington Society, represented by W. E. A. Peer. Carried.

(9) That we heartily approve of the educational work carried on in connection with fruit-growing, through the Farmers' Institutes and Fair Systems of Ontario, and express the hope that Messrs. Putnam and Cowan may be able to see their way clear to continue and extend this work along the same lines in future. Carried.

(10) That we desire to express in special manner our appreciation of the services rendered the whole fruit-growing industries of Canada by Alexander McNeill as an officer of this Association for many years and also as chief of the Fruit Division at Ottawa. We believe the prominence our industry now occupies in the public view is very largely the result of the efficient, unselfish and never-ending labors of our retiring President.

This resolution was moved by Mr. Stevens of Orillia and seconded by Mr. Peart, of Burlington, who both spoke in the highest terms of appreciation of the services of Mr. McNeill.

In supporting the motion Mr. Bunting said that he was in hearty accord with the sentiments expressed. He for one appreciated very much the unselfish service Mr. McNeill had given to the Association and the cheerfulness with which he had taken hold of anything that promised to benefit the fruit grower. He said "I have given special attention to the statistical reports prepared by his Branch, and I must say that for accuracy and comprehensiveness we never had anything in this country to compare with it, and I feel that this resolution is quite in accord with the wishes of the fruit growers generally."

Mr. Groff: As the representative of a different branch of horticulture, I may say that I heartily approve of this resolution. I have been especially impressed by the courteous consideration given to every interest that it was possible to serve by his Department or in his position as President of the Association.

Mr. Armstrong: What the rank and file of the fruit growers particularly appreciate in Mr. McNeill is his wonderful energy.

Mr. Norman E. Jack, delegate from the Quebec Pomological Association: As the representative of a sister Province, I can heartily endorse this resolution, and am assured that the other members of my Association would do so as well.

The resolution was then carried unanimously by a standing vote.

Mr. J. S. Scarff, acting Chairman, presented the same to Mr. McNeill, who said in reply: I can assure you that this resolution is a complete surprise to me. I had some little oversight of the work of the various committees, among others that of the Committee on Resolutions, but I had no idea that their report contained a resolution such as the one which has just been voted on. I thank you most heartily. I have perhaps done some little work in the interests of the fruit growers, but can assure you that I have been amply repaid by the appreciation which I have met with all through my work. While I appreciate this resolution most heartily, I appreciate equally the very warm sympathy which has been apparent to me day by day as I came among you. This in itself constitutes a very large part of the reward of my labors. Whether I am President of your Association or not, my interest will still continue, and my services are at your disposal and always will be.

(11) That your delegates to the Dominion Conference be instructed to gather all information possible with regard to the workings of the Fruit Marks Act in the past and to give careful consideration to the advisability of defining XX apples in barrels and boxes.

Mr. Harold Jones: There is a feeling, particularly among the dealers, that the XX apple should be defined by the Fruit Marks Act, and as this matter will doubtless be discussed at the Dominion Conference, it would seem wise for the Association to instruct its delegates whether to favor such definition or whether the Act should stand as it is in this regard. Under the present Act all that is required in a XX apple is that the face should fairly represent the contents of the package. In my opinion the definition of a XX will lead to many difficulties as the question has to be considered with reference to varieties.

Mr. Peart: I do not think that the time has come to define the XX grade, but that it would be premature. I think that first of all sufficient time should be given to establish thoroughly in the public mind the definition of the XXX grade. There are too many difficulties in the way at present to attempt it, and for that reason I think the Association should instruct the delegates to oppose any such definition.

Mr. Sherrington: I am of the same opinion. I have studied this question considerably and have discussed it with the officers of the Fruit Division, but have not yet arrived at a satisfactory solution. I think that co-operation on the central packing house system will work this matter out in time. These Associations will desire to secure a reputation for their number XX grade just as much as for the number one.

Mr. Lick: I should very much object to putting up No. 2 apples according to any definition I have yet seen.

Mr. Tweddle: My idea of a number two apple is that it should fill the demands of people who cannot afford to pay for the No. 1 grade. If the No. 2 is ever defined, it ought to be with this end in view. It should sell, as a general rule, at two-thirds the price of No. 1, and the consumer should get two-thirds the value of a No. 1 apple. I cannot support the contention that it should be like a number one in all respects except as to size, as that would exclude a large number of apples from being sold in packages at all, which at the same time would be quite satisfactory for the purpose I have indicated.

Mr. McNeill: I took the trouble to secure the views of about fifty prominent shippers and growers. The majority of them say by all means define the No. 2 apple, but no two of the number agree as to what the definition should be. I think you can leave this matter very fairly in the hands of your delegates, as I am sure you will not select anyone who would act upon insufficient data. My view is that we had better go slowly in this matter until we are convinced that we have the support of public opinion. Until that time arrives I shall oppose any attempt in this direction, and I am quite in sympathy with the conservative views which have been expressed.

The resolution was then carried.

(12) That we approve the suggestion contained in President McNeill's address that an expert officer be appointed to take charge of the work of the Ontario fruit experiment stations and horticultural work of the Province generally.

Mr. Pettit: Is it proposed that this official should be a man thoroughly posted in hybridization work, one who could work in conjunction with the Experiment Fruit Stations and make them more valuable by conducting or supervising a series of experiments? If so, I think he would be a very valuable officer. There is room for a lot of work of this kind in Ontario. Our experiment stations have pretty thoroughly tested varieties during the ten years in which they have been in existence, and it would seem that the time has come when work of the kind I have indicated would be of great benefit.

Mr. R. B. WHYTE: What is wrong with the present system?

Mr. MCNEILL: So far as I can judge from the criticisms expressed, it has worked very well up to date, but they have now reached the limit of the series of experiments, and a new lease of life is looked for by the appointment of an expert, who is thoroughly competent and trained to take up new work of the kind suggested.

Mr. WALLBRIDGE: Are they not doing work of that kind at the Farm at Ottawa and also at the College at Guelph? It seems to me that the kind of man we want is one generally qualified in fruit-growing matters, who could go about the Province giving instruction and advanced information. It seems to me that the kind of a man Mr. Pettit speaks of should be connected with the Experimental Farm, either at Guelph or Ottawa.

Mr. MCNEILL: As I understand it, the idea would be to attach a man to the College at Guelph with the intention that he should unify the work of the experiment stations and get the best that there is out of the system we now have.

Mr. W. E. WELLINGTON: It seems to me that the resolution is on the right lines. I am satisfied that, so far as the experiment stations are concerned, they are at a dead stop and that nothing is being done to extend the work. Such an officer, provided always that he is qualified and that the Minister of Agriculture is willing to incur the additional expense, is, I think, just what is wanted. The experiment stations at Ottawa and Guelph are doing important work, but they are not situated so as to be of general benefit to the fruit-growers of the country. This is the reason why the experiment stations were established in the first place. The experimenters should receive better pay than they are getting and there should be some one to oversee operations so that we may get an expression as to the value of new varieties from year to year. We want everything new tested and the tests made in a proper way. I think that the work of the stations should be carried on on a more extended scale and that the men who are running them should be paid something worth while. In my opinion parsimony in this connection simply nullifies the good results that should be obtained from the work of these stations.

Mr. TWEDDLE: It seems to me that work should be conducted along the line of new varieties. We need new varieties especially in plums, peaches and grapes, that will carry to distant markets. In peaches we have only one variety that will carry to the Northwest. Work of this kind might be profitably undertaken by such an officer.

Mr. GROFF: If I properly understand the matter, one of the chief objects in view is to centralize as far as possible the knowledge and information gathered by the units and groups throughout the Province with the idea of taking advantage of the knowledge and material produced by various sections of the country in order that it may be made of benefit to the Province and Dominion. The point is a very important one. In my own experience, in connection with my specialty, the expense of informing myself as to what others were doing, what could be done and what was needed, was very great. Such a system as is proposed would doubtless result in placing all the information available before the fruit-grower, and if so, it would be an exceedingly valuable movement.

Mr. JONES: I think Mr. Groff has touched the keynote of the situation. He has touched the point that means advancement in regard to the general knowledge of the fruit-growers of this country. The desirability of varieties for certain localities is a matter which the majority of fruit-growers know little or nothing about. There are certain sections or geological formations

where certain varieties grow to much better advantage than elsewhere. In my opinion the geological formation has more influence on some varieties than climate has. We have a range of hills in the eastern part of the Province where the rock formation is richer in phosphates than will be found anywhere else in North America, and these rocks have influenced the soil in the locality and it will grow apples of the Wealthy and McIntosh Red varieties that are of crisper flavor, higher color and more desirable in every way than the same varieties grown in sections where the chestnut will grow. What do we know about that as fruit-growers? What data have we to show the geological formation of the Province as it concerns fruit-growing? What data to show why an apple grown in one locality is vastly superior to a similar apple grown somewhere else? A man who is properly trained in horticulture and properly qualified to superintend, could guide the work of each individual station taking into consideration the geological situation. He could take an apple such as the Wealthy and ascertain and compare its qualities in different localities, and he could in time work out a map of the Province showing the geological formation and its relation to the data secured. Men will plant varieties which they hear are proving to be money-makers, perhaps one hundred miles away, and there is more money lost in fruit-growing because of this than perhaps from any other reason. I believe that the right man with the right ideas and a definite object in view could guide the experimenters and tell us what to do. We are set down in a little corner of the world and do not always know what is going on around us, with the result that unless we are instructed to do certain things we probably do little or nothing.

Mr. Pettit moved that a committee, consisting of Messrs. McNeill, Wellington, Hilborn, Jones and Groff be appointed to formulate a proposal and to lay the same before the Minister of Agriculture. The resolution was seconded by Mr. Peart, and carried.

SUPPLEMENTARY REPORT OF THE COMMITTEE ON RESOLUTIONS.

Your Committee on Resolutions beg leave to submit the following additional resolutions:

(1) That owing to the extreme scarcity of labor during the height of the fruit season, a scarcity involving the loss of large quantities of a valuable product, we are of opinion that the Dominion Parliament should be petitioned to allow the importation of labor from North Europe under contract during the continuance of the fruit season.

(2) That the delegation appointed to appear before the Tariff Commission be instructed to urge upon the Commission that the importation or sale of adulterated fruits be prohibited save where the cans containing such fruits show on the label the contents of the package.

(3) That this Association desires to congratulate Mr. T. H. Race on the extremely able manner in which he represented not only the fruit-growing industry, but the whole of Canada, at the St. Louis Exposition, at Liverpool, and again at the recent Exhibition at Pittsburg. This Association has pleasure in testifying its belief that Canada is always worthily represented and the fruit-growing industry has a special champion when represented in the person of Mr. Race.

(4) That we desire to place upon record our recognition of the value of the service performed by the Department of Agriculture of Ontario, in collecting this year, apple statistics showing numbers of trees and varieties of fruit and further statistics relative to quantities and prices of fruits purchased from growers by proprietors of canning factories, and also in the operation of power sprayers at Meaford and Trenton.

(5) That we as fruit-growers, to whom a prompt mail service is of vital importance, would respectfully but most strongly urge Hon. Mr. Aylesworth, Postmaster-General, to secure legislation authorizing the inauguration of a system of rural mail delivery.

Experiment Station for Southern Ontario.

A resolution was presented urging upon the Provincial Government the necessity for establishing an experimental fruit station for Southern Ontario. Mr. Alexander McNeill, speaking in opposition to the motion, pointed out that Ontario already had a system of experiment stations, two of which were located in the southern section. He thought that as the Association had already passed a resolution in favor of the appointment of an expert horticulturist, with a view to making the work of the stations of greater value, to pass such a resolution as the one indicated above would have the effect of making the Association look somewhat foolish. Mr. Tweddle stated that he believed the Association had taken the right course in recommending the appointment of a horticultural expert, but he considered that so far as the southern section was concerned, more than this was required. He stated that there was great need for improved varieties of peaches, plums and grapes which would carry to the markets of the Northwest. For example, they needed early and late peaches of a quality as good as the Crawford that would carry to these distant markets. There was at present nothing to meet the requirements and it was very much the same in regard to plums and grapes. He considered, therefore, that the work of experimentation should be taken up and carried out on a larger scale in the district. In reply Mr. McNeill maintained that this was exactly in the line of work which was proposed for the horticultural expert. He agreed that the objects suggested by Mr. Tweddle were of the utmost importance, but as two stations were already established in the district, what was proposed was to make these stations accomplish the work Mr. Tweedle desired to see performed. The resolution was finally withdrawn by consent of the committee.

COVER CROPS: THEIR RELATION TO THE FERTILITY AND MOISTURE-CONTENT OF ORCHARD SOILS.

By Frank T. Shutt, M. A., Chemist, Dominion Experimental Farms, Ottawa.

The development of the fruit growing industry in Canada during the past fifteen years has been marked by, or I might say has in a large measure been the outcome of, certain advances in the rational treatment of our orchards. We all recognize that much has been accomplished through the adoption of improved methods of picking, sorting and packing, by better storage and transportation of the fruit; but this acknowledged, we must realize that the more recently introduced methods of soil treatment in the orchard and the keeping in check of insect and fungus pests by spraying, have had very much to do in the production, both as to quality and quantity, of our marketable fruit.

In these matters of soil management and spraying, fruit growers are much indebted to scientific research, and, speaking generally, we have not been slow to put into practice the methods indicated by the results of investigations carried on in American—I use the term in its geographical sense—agricultural institutions. Very much good work has been done in the Experiment Stations of the United States, but we have also in Canada contributed our part toward that knowledge that we now possess regarding the rational growing of fruit. The Canadian agricultural institutions, Federal and Provincial, have recognized that our conditions necessitated in many instances modifications of the general plan; that our problems called for a special solution, and as a result they have, I believe, done most useful work towards putting fruit growing on a paying basis.

It must not, however, be lost sight of that it is necessary, each one for himself, to do a certain amount of experimental work. The principles can be established from the researches of the trained expert who has all the necessary apparatus at hand to assist him, but in the application of these principles, if we would obtain the best results, there must be brought to bear the intelligent study by the individual, for there are many soils and many climates in our fruit growing districts. I am careful to emphasize this aspect before bringing to your notice the data of our experiments, lest any should suppose we are laying down a hard and fast plan of procedure suitable to all alike.

It is my purpose, then, to-day to present in brief form certain of the chemical data we have obtained on the Dominion Experimental Farms relative to the enrichment of the orchard soil, and the control of its moisture through the use of cover crops. In the main I shall let the facts speak for themselves, indicating merely the deductions that may be made therefrom and the broad principle they support.

The term cover crop was, I believe, first used by Prof. Bailey, of Cornell University, in 1892, who was then advocating the breaking away from the old plan of keeping orchards in sod. His suggestion was to grow a crop in the late summer and autumn which would afford a winter protection to the roots of the trees and at the same time enrich the soil. Such a crop he designated a "Cover Crop." Prior to that time the general practice no doubt was to utilize the soil of the young orchard for some vegetable or farm crop; when the trees had attained such a size that this was no longer possible or profitable, the orchard was allowed to grow a sod—the grass being pastured or cut and cured according to the fancy of the owner. Occasionally the orchard received a dressing of barnyard manure, but this unfortunately, was the exception rather than the rule, it being scarcely recognized that our orchard trees required to be fed, as other farm crops. There are, no doubt, to-day many good orchards in sod, but their number is steadily decreasing; and we find the majority of advanced orchardists abandoning the old method, and employing some modification of the cover crop system.

There are several reasons against a permanent sod in the orchard. One is that the grass is robbing the trees of that moisture and plant food necessary for their legitimate growth and for the production of fruit. I shall show you later from our experiments that sod, and especially an old, established sod, very rapidly exhausts a soil of its moisture. The loss takes place partly by transpiration through the leaves of the grass, and partly through capillarity and surface evaporation. In consequence of this the trees suffer in seasons of insufficient rainfall. In an orchard covered with sod it is true

that the tree roots are nearer the surface than in a cultivated orchard, but nevertheless it is an unequal battle between them and the grass, with the result that the moisture is entrapped and used by the grass—*and this, as a rule, just at that time when the trees are needing it most*, viz., from May to July. As to the extraction of the elements of fertility from the soil by the grass, I have only to point out that a yearly yield of two tons of timothy hay per acre will remove in ten years about 600 lbs. of nitrogen, 400 lbs. of phosphoric acid, and 900 lbs. of potash. There are, I know, soils so well supplied with moisture and so rich in plant food that the newer method of which we are speaking is not necessary, but such soils, we are assured, are by no means common.

Objects Obtained by Cover Crops and Cultivation. As you are well aware by this system the land is part of the year under a crop and part under cultivation. We seek thereby to (1) enrich the soil in humus and nitrogen; (2) to regulate or control the soil moisture; (3) to furnish protection to the tree roots during the ensuing winter; (4) to arrest the loss through the leaching of the nitrates in the autumn. It is only with respect to the two first named features that this paper deals. The data have been obtained in the orchard and the laboratory during the past ten years, and in all this work I have had the advice and co-operation of my colleague, Mr. W. T. Macoun, Horticulturist, of the Experimental Farm, Ottawa, whose interest in these investigations has throughout been most enthusiastic.

The Cover Crop System: In outline the treatment of the orchard soil is as follows: The land is kept thoroughly cultivated throughout the spring and early summer months, say, until early in July. This conserves the moisture for the growth of the trees, favors aeration of the soil and nitrification of the humus. The cover crop is then sown. This is preferably one of the legumes. The crop is, as a rule, allowed to remain until the following spring, possibly till the second or third week in May, when the growth is turned under and the soil cultivated as many times as is deemed necessary until the beginning of July, when a cover crop is again sown. The growth of the cover crop in late autumn abstracts much moisture from the soil, naturally checking growth of the trees and thus indirectly causing the early ripening of their wood.

The dates of these various operations are by no means fixed; they will naturally depend on the condition of the soil and the district in which the orchard is situated. Thus, if a drought is not unusual in the early summer months, plowing under the cover crop should not be later than the middle of April—even if there then be little or no spring growth. By this means a dry earth mulch may be maintained by cultivation which will conserve the moisture from the winter's snow and early spring showers. On the other hand, if a generous and well distributed rainfall may be expected, the clover or other legume may be allowed to remain throughout the summer, mowing the crop occasionally and leaving the cut material as a mulch. The system allows of much modification, and in this lies one of its best features; it lends itself readily to adaptation. The observant eye of the orchardist must note the necessities of his trees, the characteristics of his soil, the climatic conditions prevailing in his district—the practice may then be adapted accordingly.

The Enrichment of the Soil. Why should it be necessary to enrich the orchard soil? In the first place because there is an annual draft upon the available soil plant food by the trees. We have done a considerable amount of

work on the chemistry of the apple, and I compute from our analyses that the following amounts of the essential elements of fertility are removed in ten years per acre: i.e., by forty trees, when the orchard is in full bearing: Nitrogen, 600-650 lbs., phosphoric acid, 135-150 lbs., potash, 700-850 lbs. These amounts are, of course, distributed between root, trunk, branches, twigs, leaves and fruit; a part is locked up in the wood of the tree, a part is lost in the leaves and fruit. Compared with other farm crops, the orchard is not exhaustive in the sense that that term is usually applied, but nevertheless our results show the necessity for a continual supply of plant food in an available form.

Some years ago we analyzed four well known varieties of apples, and from the data then obtained, and assuming a yield of 160 barrels per acre, I calculate that the amount of plant food removed in the fruit from this area, per annum, would be from 9 to 10 lbs. nitrogen, 5 to 6 lbs. phosphoric acid, and 32 to 35 lbs. potash. These amounts, as you will notice, are by no means excessive.

We also analysed the leaves of the apple tree, collected in May and September. We found that as the leaves ripened there was a considerable return of the plant food they contained to the wood, so that the fallen autumn leaves are not as rich in potash and phosphoric acid as when they were younger. However, a 1,000 lbs. of the leaves in September, still green and containing 60.71 per cent. of moisture, would contain nearly 9 lbs. of nitrogen, almost 2 lbs. phosphoric acid, and approximately 4 lbs. of potash. It has been estimated that in the fallen leaves per acre an annual loss may ensue of approximately 23 lbs. nitrogen, 6 lbs. phosphoric acid, and 12 lbs. potash. A part of this may, of course, be returned to the soil, but owing to high winds in the autumn it is extremely doubtful if much of it gets back to where it came from, unless there is a cover crop to hold the flying leaves.

So far as the soil is concerned, the plant food stored in the wood and that in the fruit must, of course, be regarded as lost.

Without unduly lengthening this paper we could not now stop to discuss in any detail the losses of soil plant food in other ways. If the orchard is in sod and the hay removed, the exhaustion is greater than that incidental to the growth of the trees. If, on the other hand, the soil is continuously under cultivation there necessarily follows a very considerable loss of nitrogen and destruction of humus. This fact we have recently established in the Experimental Farms laboratories. It is very evident, therefore, that under all ordinary conditions there must be a return of plant food if the orchard is to thrive. We think this in the majority of instances can be accomplished in the most economical way by the growth and turning under of one of the legumes. This class of plants might be known as nitrogen-collectors, for they are able through the agency of certain organisms (bacteria) that reside in their roots to appropriate and build up into their tissues free nitrogen from the atmosphere.

The Functions of Humus in the Soil. Before speaking more particularly of our data regarding the amounts of nitrogen that can be added to orchard soil by the leguminous cover crops, I would for a moment emphasize the importance of humus as a soil constituent. Every arable, every fertile soil consists of two classes of constituents: broken down rock matter, i. e., disintegrated and semi-decomposed rock matter, and semi-decayed vegetable matter, commonly known as humus. We have had investigations in hand for several years, more particularly at Indian Head and Brandon, because

there they follow the system of fallowing. This we find is very hard upon the soil and that there is more available matter destroyed and more nitrogen dissipated by fallowing than is removed by the crop of grain. Whatever destroys the humus in the soil, dissipates the nitrogen. When by excessive cultivation we let the air into the soil just as we open the damper of a stove, we destroy humus and dissipate nitrogen. Every favorable soil contains a large number of micro-organisms. Without the humus, they cannot live; it is their food. Consequently if we would have that agency which nature has provided for the conversion of insoluble plant food into available forms, we must have humus, for these organisms to live upon. Most of the potash and phosphoric acid used by plants is not taken directly from the undecomposed rock material, but is taken from the humus as it exists there in a more soluble form better adapted for plant food. Humus is not only the source of nitrogen, but also largely the source of potash and phosphoric acid. Very briefly, the functions of humus are as follows:

1. It conserves the nitrogen. Soils rich in humus are those rich in nitrogen, and vice versa. Whatever destroys the humus, dissipates the nitrogen.

2. It increases the absorptive power of soils for moisture—and this whether they be clays or sands.

3. It improves the tilth or mechanical texture of soils, mellowing them and making them more friable, and better adapted for root extension.

4. It makes possible the life of those soil organisms whose function it is to convert insoluble, unavailable soil constituents into soluble, available forms.

5. It furnishes in its further decomposition not only all the nitrogen used by our crops, but also the greater part of the phosphoric acid, potash, lime, etc., required by them.

The mineral matter in humus is not large, but it is readily transformed into available compounds.

6. It regulates soil temperature, preventing rapid changes.

7. It diminishes the loss of plant food by drainage.

Recognizing, then, the importance of humus and the fact that it may be readily dissipated, it is encouraging for us to know that by the growth, say, of one of the clovers, we can add in one season from 1½ to 2½ tons of organic matter per acre, and that this will in a short time become part and parcel of the soil's store of humus.

The Legumes as Nitrogen-Enrichers. Our work in the estimation of the nitrogen furnished by the legumes was begun in 1894 and has been continued more or less every year since that date. The results of these investigations, carried on simultaneously in field, orchard and laboratory, are to be found in the Reports of the Experimental Farms, and consequently there is no occasion to bring them before you in detail to-day. To simplify matters, eliminating much that we could not discuss to-day for lack of time, I have constructed the following table. It states the yield, the nitrogen, the organic matter, and ash constituents contained in various legumes after three months growth, viz., from 1st July to 1st October, in the orchard.

Orchard Cover Crops—Central Experimental Farm, Ottawa.

Period of Growth : July 1 to Oct. 1. (approximately).	Weight of Crop per acre.		Nitrogen per acre.	Organic Matter per acre.	Mineral Matter per acre.
	tons.	lbs.	lbs.	lbs.	lbs.
Clover, Common Red :					
Stems and leaves	4	1,779	70	1,824	481
Roots	2	1,445	48	1,394	172
Total	7	1,224	118	3,218	653
Clover, Mammoth Red :					
Stems and leaves	6	1,310	82	2,269	508
Roots	3	1,260	48	1,409	219
Total	10	570	130	3,678	727
Clover, Crimson :					
Stems and leaves	11	234	85	2,093	602
Roots	3	201	19	801	199
Total	14	435	104	2,894	801
Alfalfa :					
Stems and leaves	5	1,192	75	2,664	510
Roots	5	558	61	3,120	613
Total	10	1,750	136	5,784	1,123
Hairy Vetch :					
Stems and leaves	11	1,895	129	3,689	425
Roots	2	345	18	536	56
Total	14	240	147	4,225	481
Soja Beans :					
Stems and leaves	7	350	82	3,319	313
Roots	1	900	13	549	28
Total	8	1,250	95	3,868	341
Horse Beans :					
Stems and leaves	7	733	63	2,193	156
Roots	2	852	15	605	39
Total	9	1,585	78	2,798	195

These results are to be considered as representative rather than absolute; they have been obtained in several instances by averaging the data from two or more seasons. We find, as might be expected, that results vary according to the nature of the soil and of the season, and the abundance of nitrogen-gathering bacteria in the soil. Again, although the table gives a larger crop yield and nitrogen content for the Mammoth Red than for the Common Red clover, it must be pointed out that several of our experiments have shown the reverse. If it had been possible to determine the relative values of these legumes upon soil alike throughout all the plots and during the same season, the data might have been more strictly comparable, but this was not possible.

We cannot state exactly what proportion of the nitrogen as recorded in the table, has been drawn from the atmosphere, or to put it in another way, what proportion previously existed in the soil. The probabilities, however, are that the greater part of it is from the air. This assumption is made from the fact that the increase in nitrogen content of a soil by the turning under of clover has been found almost equal to the amount of nitrogen contained in the clover. Experiments conducted during the past three years show that by

the decay of turned-under clover the nitrogen of the soil has been increased on an average to the extent of 85 lbs. per annum. A consideration of all our data leads me to the conclusion that according to the nature of the soil and the character of the season we may enrich the orchard soil with from 75 lbs. to 125 lbs. of nitrogen per acre by one of the legume crops. This amount would be contained in 8 tons to 10 tons of fairly good barnyard manure.

It is a significant fact that in the case of the two clovers—Mammoth Red and Common Red—practically one-third of the total nitrogen is in the root system. Undoubtedly these two are the most commonly useful of all the clovers as orchard cover crops.

Crimson Clover seldom survives the winter in the colder districts, and consequently gives no spring growth. Neither does it, as a rule, furnish as much nitrogen by its summer and autumn growth. Its root system does not equal those of the two first-named clovers.

Alfalfa on suitable soil has done very well, furnishing somewhat more nitrogen than clover, half of which is contained in the extensive root system. From all points of view it is undoubtedly a most valuable cover crop.

The Hairy Vetch, though a low growing plant, has given most excellent yields—nearly 12 tons of foliage per acre, containing more than two tons of humus-forming material. This foliage is very rich in nitrogen, the crop containing 150 lbs. of this element per acre. It is, therefore, a plant of high fertilizing value when turned under, in spite of the fact that it has a very small root system.

Soja Beans and Horse Beans. These in point of nitrogen fall behind the crops already dissussed. They are, nevertheless, important as cover crops from the fact that they may be sown in drills and cultivation of the soil between the rows continued must later than if a broadcast-sown crop were used. They are also excellent snowholders.

The Importance of Moisture Control. We have come to realize in these later years that one of the most important problems in agriculture is the control, the regulation, of soil moisture. It is a large subject, and if discussed fully would involve the question of drainage—a matter of considerable interest to the orchardist,—the question of aeration of the soil, and several others. I purpose speaking of two phases only, phases that immediately touch upon our work under discussion—cover crops in the orchard.

All the soil-formed food that plants absorb must be in a state of solution before the crops can utilize it; the feeding rootlets can only appropriate, as it were, highly diluted food. In order then to obtain their food from the soil, crops require vast amounts of water. It has been estimated that at least 300 lbs. of water are taken up by the roots for every lb. of dry matter stored up in the stem, leaf or fruit. During the growing season we are to understand there is a constant stream of water passing through the tissues of the tree, parting with its dissolved material to build up, here and there, the various parts and organs of the tree, and finally transpired by the leaves and so returned to the atmosphere. In this way, probably more than 1,000 tons of water per acre each season are absorbed by the roots of a mature orchard, and this in addition to the water retained in the tissues of the tree and fruit, and that lost by capillarity and surface evaporation.

What is true of the tree is likewise true of the grass. To produce a crop of hay will require at least from 500 to 600 tons of water. Unless the season is one characterized by an abundant rainfall there are few soils that can support both grass and trees with all this moisture, and, as I have already said, it is the trees that suffer.

It is essential then that while the tree is making its growth and its fruit filling, there should be a sufficiency of soil moisture. This, as we have seen, is not likely to be the case if during that period a second crop—a surface feeder—is grown on the same area.

But it will not merely suffice in many districts to leave the trees the undisputed crop upon the soil during the growing season. In soil that is bare of foliage and left undisturbed, capillarity is set up and surface evaporation takes place. How can this be prevented? By occasional cultivation. The dry earth mulch so formed breaks up the capillarity tubes and thus arrests evaporation. It seems clear, then, that cultivation should be practiced during the spring and early summer. Is it essential or desirable that it should be continued throughout the season? I think not.

Some few years ago we determined during the autumn and winter the moisture content in the twigs of ten varieties of apples. These apples included some of the hardiest and some of the most susceptible to cold of the varieties that can be grown in the Ottawa district. Our results showed that the hardiest were those containing the least water. Indeed, the order of their moisture content was the order, or practically so, in which the Horticulturist, Mr. Macoun, had arranged the varieties according to observed hardiness. This goes to support the view that growing tissue contains more water than mature wood, that cessation of growth and early maturity of the wood may be induced by limiting the soil moisture supply, and that such mature wood is better able to withstand very low temperatures. It seems quite probable from the results of this investigation that the character of the autumn, both as to rainfall and temperature, may have very much to do in determining the immunity of the trees during the following winter.

Arguing from these premises, it is clear that to check the growth of the orchard trees in the autumn, abstraction of the soil moisture is very desirable. This can be accomplished through the growth of the cover crop sown in July.

For five years past we have conducted experiments in this matter of soil moisture control in the orchards of the Experimental Farm at Ottawa, and for two years past, similarly on the Experimental Farm at Nappan, N.S. The results and the conclusions therefrom are to be found more fully in the annual reports of the Chemical Division of the Experimental Farms. I need not now, therefore, enter into any detailed account of this work. A few of the more important data and deductions may suffice.

Let us consider first the case of an orchard in sod. In 1902, one of our series consisted of two adjoining plots, the one cultivated throughout the season; the other, in sod two years old. The soil was light and sandy. The rainfall throughout the summer was ample and well distributed. The samples of soil for moisure determination were taken every two weeks, beginning April 19th, and represented a depth of 14 inches. These two plots started out with practically the same moisture content, 15.5 per cent., but as the season advanced and the grass grew, the demand on the soil moisture in the sod plot became greater and greater. This became evident very soon after May 1st. By May 15th there was 50 per cent. more moisture in the first 14 inches of the cultivated plot. At the end of May this difference had increased to almost 100 per cent., or, in other words, there was nearly twice as much moisture in the cultivated soil. The percentages on May 31st were 17.3 and 9.8, respectively. This represents a difference of nearly 200 tons per acre. Throughout the whole growing season differences of a marked character and always in the same direction were to be observed. The data are of a most decisive nature, pointing to the heavy call on the moisture of the orchard soil by sod at a time

when the trees are most in need of it. It was not until October 18th, the close of the season, when vegetative growth had ceased, and there was a liberal rainfall that the two plots approximated once more in their moisture content.

In 1903, a severe and unusual drought prevailed at Ottawa during the spring and early summer months. It affords an excellent opportunity to prosecute this research on the conservation of soil moisture. On May 23rd, on adjoining plots, the moisture in the cultivated soil was 12.65 per cent.; in the soil under sod, 4.78 per cent.—a difference equivalent to 180 tons of water per acre. The soil of the cultivated plot was quite moist to the touch, and the trees had not visibly suffered; the soil under the sod was a powder, apparently dry, and the leaves of the trees had begun to wither and fall. Enough has been said. It will not be necessary to follow the results in detail throughout the season till the drought broke. They emphasize the very exhaustive character of sod as regards soil moisture, and furnish proof of the immense value of cultivation in arresting the drying out of soils. Further, in another series we had that year, our data pointed out the desirability of early turning under the cover crop, and, if this is done by the plough, *immediately* working the soil with the cultivator in order to again set up capillary action with the underlying soil and creating an earth mulch to prevent surface evaporation.

We have referred to the growing of a grain crop in the orchard. Our experiments at Ottawa and Nappan show that this practice is to be condemned, for it makes an unusually large draft on the soil moisture at a time when the trees most require it. Trials were made with oats, winter rye and buckwheat. It will prove of interest to cite certain of the data we obtained. First, with regard to rye: During the first month of the investigation, May 9th to June 9th, the growing rye reduced the water content of the soil 5.89 per cent., equivalent to a loss of 150 tons of water per acre of 14 inches, over and above that lost on the adjoining cultivated plot—and this in spite of the fact that during that period there had been 2½ inches of rain. By the 23rd June, the percentage of moisture in the rye plot was still further reduced, though the cultivated plot maintained its initial percentage. This continued until a determination made about the middle of July showed but one-third the amount of water in the rye plot compared with that of the cultivated soil. The data of the oat and buckwheat plots are of a similar nature, though in certain particulars not quite so pronounced as those from the winter rye.

We also estimated the losses of soil moisture caused by growing a grain crop as compared with those resulting from the growth of the legume crops —clover and hairy vetch—and found in every instance that the soil bearing the grain crop suffered the greater loss. This is probably owing in a large measure not to greater transpiration, but to surface evaporation being more active in the grain covered soil; the soil carrying the clover and vetch is much shaded by their foliage, and thus evaporation is checked.

The effect of the various legume crops upon the soil moisture has been very fully studied. As it would be impossible now to recount all our experiments, I would present the following summary of the results obtained:

Soil moisture is retained by cultivation; is lost by growing a crop. This is true, of course, in spring, summer, and autumn, and consequently in this system we have a means of controlling the water supply of our orchard trees at all seasons during which it may affect their life or thrift.

The difference in the moisture content of soils from adjoining plots—the one under cultivation; the other, supporting a growing crop—is dependent

upon several factors: in amount, it may vary from a few tons to more than 200 tons per acre, in the surface 14 inches of soil.

The larger the rainfall, the less difference in moisture content of these two plots, and vice versa. Cultivation is, therefore, all the more necessary with a restricted or limited rainfall.

The amount of transpiring surface or foliage materially affects the loss of soil moisture; the larger the crop, the more water it takes from the soil.

The character of the soil determines in some measure the extent of the loss. If capillarity is easily set up in the undisturbed soil, viz., that which is bearing a crop, water escapes by surface evaporation.

The shade afforded by a cover crop prevents in a degree surface evaporation.

Cutting the cover crop and using the material as a mulch, checks the loss of soil moisture. This allows in some districts and on certain soils growing the cover crop throughout the summer without unduly affecting the water supply of the trees.

REPORT ON RESULTS OF THE SEASON'S SHIPMENTS TO WINNIPEG FROM THE ST. CATHARINES COLD STORAGE COMPANY.

By Robt. Thompson, St. Catharines.

Early in the spring of this year several of the leading growers and members of the St. Catharines Cold Storage and Forwarding Company, Limited, met and agreed to co-operate and see if some arrangement could not be made and carried into effect whereby an opening could be secured for the disposal of our tender fruits in the Winnipeg and Western markets to supplement the efforts commenced in 1904 under Prof. Reynolds. It was realized that some sacrifices would have to be made the first season to enable us to secure a foothold and overcome some of the prejudices against Ontario fruits and Ontario packers, many of which were unfounded and were caused by dealers handling Western and American fruits.

Arrangements were at last made with the Ottawa Fruit and Produce Company of Winnipeg to handle our goods on commission and we agreed to ship the first car about the middle of August and ship every Tuesday and Friday, one car on each date, making two cars per week until the end of the season. The first car left on Friday, August 18th. Some twenty-five or more of our shippers by this time were anxious to join and ship some of their produce. A committee had been appointed to assist the directors of the Company in the management and handling of the details and it was felt that to refuse these shipments would cause hard feeling and possibly incur the ill-will of some, and as it was for the best interests of our other co-operative work that no cause for any disagreement should be given, no restrictions were placed as to the varieties of fruit and quantity of each to be placed in the cars by each individual shipper, provided he notified those in charge a reasonable time in advance of his intentions; neither were any restrictions placed as to the style of package and packing, provided it were honest. As a result all makes of baskets and variety of packages were brought to the cars and great difficulty was experienced in filling the cars snugly and safely. This was overcome after the first two cars by dividing the car into three compartments by first filling say one-third at each end with packages nearly alike and then

putting up two solid partitions or bulkheads. After this little or no trouble arose from packages being damaged in transit.

Another serious difficulty confronted us by thus allowing every shipper to use his own judgment as to what he placed in each car. For instance, the first few cars contained from seven to eight hundred packages of tomatoes and only from four to five hundred of all other varieties of fruits. As a consequence tomatoes sold for little above cost of package, freight and commission. Later on some other variety of fruit would be overdone at times. When the first returns came in and those shippers who had placed tomatoes exclusively in the cars dropped out, we were confronted with the fact that unless something were done the shipments would have to be discontinued. Two cars had gone out light with only about eight tons of fruit in each, and you can readily see that freight on such would be very high. Two or three of the committee agreed that they would place all of their fruit going on commission in these cars, and if necessary buy enough to enable the cars to go forward as agreed. From this time to the end of the season no car went out light. It is true we had to place in these cars some baskets possibly not well filled, that we had to buy and at times we had to take baskets of pears and apples intended for other nearby markets and even pretty ripe tomatoes to make weight.

Just at this point I must digress for a moment to refer to the publication in not only our local papers, but in the leading Provincial and Dominion dailies of statements, purporting to be made by a Mr. Andrew Haynes, of Louth Township, who was sent out by the Department of Agriculture and accompanied one of the cars sent to another commission house in Winnipeg. In justice to our fruit-growers who shipped in these cars, I must most emphatically deny the truth of such misleading statements, as not a single barrel of apples was shipped from St. Catharines this season to the West in these cars. Not a single complaint of fruit being falsely packed in boxes or baskets was received from any buyer. I saw nineteen-twentieths of all the fruit placed in these cars, and examined the individual shipments frequently so as to be able to make notes on my copy of contents and shippers in the cars for future reference to see if we received more for better grades of fruit or better packages and packing, and also to judge of the ripeness of fruits shipped. I can truly say that in all the cars sent forward—twenty-eight in all—I did not find a single package dishonestly packed. I might also say that Mr. Carey or some other Inspector was present when over one-half of these cars were being loaded, and saw a portion of the contents of each and they can and will verify my statements. I think this speaks well for our shippers. I am sorry Mr. Haynes has not seen fit to have these statements corrected, and it will be only tardy justice if the papers that so readily copied and published the statements referred to would now publish the denial. We hope and trust that whenever any fruit-grower or Association of shippers is honestly trying to improve the packing and to overcome some of the difficulties arising from long distance shipments, that encouragement will be given to them in future by our officials and not have discredit thrown on them by classing all with some one dishonest packer out of hundreds of honest forwarders.

Early in the season the Dominion Government, through Mr. Moore, Chief of the Markets Division, placed thermographs in about one-half of the cars. These records are very interesting to study, and we feel from the results obtained that next season we shall ask that these be continued. Now for the results and conclusions we have come to, from the data received so far, (for there are still a few cars, detailed statements for which we have not received):—First, that it is not wise for any number of shippers, unless belong-

ing to a co-operative association and having a storage in connection, to undertake to place cars in the West, as the kind of package to be used, the quantity of each variety of fruit to go in the car, must be named by the committee in charge, and there must be a sufficiency of fruit to fill each car on date of shipment. Few shippers are disposed to take the extra trouble in getting ready for long distance shipments. Packing in boxes or fancy packages without skilled and steady help is useless, as the results of our first efforts at box packing would show. The packing in boxes was kept up by two of our shippers and the results are very gratifying. Box pears, wrapped, which sold at first for from $1.35 to $1.60 per box, advanced steadily and sold later from $2.00 to $3.40 per box. You will see from the figures that I give later that between 1,100 and 1,200 boxes were shipped to Winnipeg and of these over 1,000 were shipped by two of our growers. Only six men placed fruit in over one-half of the cars and these men are the most sanguine for the future.

A difficulty we encountered was to know just what degree of ripeness to have our fruit in. If the car should go forward and reach Winnipeg in five days or less and be placed on the market the next day, the fruit would probably be green, whereas if the car was delayed and took eight days in transit and not be sold for two or three days, the fruit would be spoiled if placed in the car even half ripe.

To summarize shipments: The first car left here on August 18th, the last on October 30th. Twenty-two cars were sent to the Ottawa Fruit and Produce Company, three to another wholesale house in Winnipeg, two sold to a firm in Calgary, and there was one car of vegetables. In these cars forty-two shippers placed fruit, but only six shippers had fruit in more than half of cars, twenty-five in four cars or less, and seventeen in over four.

TOTAL PACKAGES SHIPPED TO THE WEST.

3,300 baskets of tomatoes.	915 packages of peaches.
3,100 trays of tomatoes.	38,643 baskets of grapes.
300 baskets of crab apples.	610 packages of plums.
1,300 baskets of apples.	262 baskets of quinces.
70 boxes of apples.	8 boxes of quinces.
5,300 baskets of pears.	24 baskets of peppers.
1,140 boxes of pears.	

The above fruit sold for $17,763, besides a car of vegetables.

I have given the darker side of the year's work, showing our difficulties and not our successes. I think this only right, as the first season there will be disappointments and we feel that we have learned many lessons that we will profit by, next season.

The men who stayed with the shipments throughout the season were unanimous in their conclusion that the price received was on the average equal to, if not greater than, the price in the Ontario and Quebec markets. They are prepared to go on next year and arrange with those who handle the fruit to supply so many carloads. We never sold so much fruit f.o.b. at St. Catharines as we did this year, and when the local market was glutted with grapes we were able to keep just that quantity out of the market here by shipping them to the West.

Mr. ANDREW HAYNES: As my name has been brought up in connection with the report just read, I desire to place the facts clearly before the Association, and have them fairly understood. When I was in the West my at-

tention was drawn to a certain shipment from Ontario, which was a disgrace to those who made it, and I so expressed myself to the reporter that interviewed me. Unfortunately, when the report appeared in the press, it associated the shipment with growers in the St. Catharines district. Had I observed the report at the time, I would have taken steps to have had the facts clearly understood. My difficulty in publishing this explanation was that I should have been obliged to publish the names and the locality in question. I did not go to the West with the intention of inspecting fruit. I regret exceedingly that discredit should have been reflected on the St. Catharines growers through a misstatement in the press.

Mr. McNeill: I can corroborate Mr. Haynes' statement in so far as that I know he was there at the time a very bad shipment was made, and his statement corresponds with the report of our inspector that this shipment was a scandal and a shame to the fruit-growers who put it up. It did not come, however, from the St. Catharines section.

Q. Has there been a prosecution?

Mr. McNeill: Not as yet, but I can assure you that there will be one.

J. A. Ruddick, Chief of Transportation and Markets Branch, Ottawa: Mr. Thompson has given you some interesting information regarding the Winnipeg shipments of fruit. That brings up the question of long distance transportation of your fruit. In considering that, we must of course realize that when we undertake to ship fruit to Winnipeg, we have a somewhat difficult proposition before us. While a car of fruit may carry successfully for a twenty-four hour journey, it is an entirely different matter to have it carry successfully for four or five days. The first thing to consider is the car. There are a number of different styles of refrigerator cars, but they are all constructed on similar principles. There are, I consider, one or two essential points. First, the ice bunker should carry sufficient ice to keep the car cool between icing stations, and also to reduce the temperature in the car. Second, there must be provision for a proper circulation of air. The partition which forms the bunker at the end of the car should be open top and bottom and the car should be so constructed that it is not possible to pile the packages closely against these openings, so as to prevent circulation, which is often done. In some cases it is not possible to leave the opening unless you pile the fruit some distance away from the partition, which is likely to result in the packages shifting in transit. There should also be a grating of slats on the floor of the car so as to permit of ventilation and drainage. These slats should be flat—not rounded on the upper surface as is sometimes seen, as they do not provide a proper foundation for the packages, and light baskets especially are apt to break down under such conditions. Before loading a refrigerator car the drain pipes should be examined to see that they are not clogged. Our inspectors frequently find that in icing a car, the sawdust is not carefully removed and blocks up the drain-pipe, which results in the flooding of the bottom of the car.

I think these shipments prove conclusively that if you want fruit to remain cool as far as Winnipeg, it is necessary that it should be cool before it is placed in the car. It should be borne in mind that there is a great difference between a cold storage warehouse and a refrigerator car. If the fruit is placed in the car in a hot condition, the cooling capabilities are not sufficient to materially reduce its temperature, especially in view of the fact that the fruit itself is all the time generating a certain amount of heat. The car is at a further disadvantage owing to the fact that it must be loaded to its fullest capacity. If you were to fill a cold storage warehouse in the same way, no amount of refrigeration would cool off heated fruit in a reasonable

time. There is always a reserve of space in the warehouse which tends to keep the temperature down. In shipping butter to Europe I find it necessary to chill it in a cold storage warehouse before it goes on board the steamer instead of taking it from the car to the vessel direct. The same principles apply there, as the steamer chamber is filled to its full capacity. There is this difference between fruit and dairy products that, with the latter there is no temporary increase of heat, whereas with fruit the amount of heat evolved in the process of ripening is perhaps greater than is generally supposed. In the case of the Winnipeg shipments the temperature outside the car was sometimes as high as eighty-five degrees, and at that temperature fruit ripens much faster than at sixty degrees. As a result of this we found that the recorded temperature of the first Winnipeg car which left on August the 18th was eighty-five degrees at the outset and that it fell gradually to seventy-one degrees, which is a very high temperature for carrying fruit for such a long distance. The other cars, which were despatched when the temperature was lower and where the fruit was cooled down to fifty-four degrees at the start, reached a point as low as forty-three degrees before arriving at Winnipeg.

A great deal has been said about the loading of cars. It should be remembered, especially in shipping fruit in baskets, that where you pack baskets to a height of six to eight feet in a car, there is, during a long journey, a very great strain on the lower tiers. One basket is a little weak, perhaps, and breaks down; the weight is then thrown on the others, and they all begin to go. Under such conditions, if the fruit has become a little ripe, the packages are more or less saturated with the juice and weakened on that account. I think it is desirable to put a packing of strips of half-inch wood between the packages in the lower tiers in order to distribute the weight. This packing should be placed over the tops of the baskets so that the baskets above rest on these strips. This system also promotes circulation of air through the fruit, and further, it stiffens the bulk of the packages and combines them together. This is a great advantage especially on a long journey, as it prevents the shifting which must otherwise occur with the continual swaying and jerking of the car back and forth.

My department had little to do with these shipments except that one of our inspectors was present when the car was shipped and also on its arrival at Winnipeg. Mr. Carey, also, accompanied one car to Winnipeg. We did, however, place thermographs in the cars so as to get a record of the temperature, and this is really the first time we have succeeded in getting good records. The thermograph case is stored away in the car with the fruit, the case being so constructed that a circulation of air is allowed through it. The Department has one hundred and thirty of these thermographs, and during the past season we had two hundred and seventy-seven records of temperatures in the holds and chambers of steamships carrying perishable products; so that we know in each case exactly what the temperature was from the start of the voyage to the finish. From these, blue-prints are afterwards made and copies are available for any interested shipper who has a cargo on that vessel. A thermograph is more rapidly affected by changes of temperature than the ordinary thermometer, and makes an accurate record of these changes. When the machine arrives at its destination, the chart is taken off and indicates the varying temperature during the trip. A thermograph is also a very good means of ascertaining where the delays occur, because, where the car is standing, the record is clear, but while the car is in motion, it is more or less blurred. We find from this record that some of the

cars in these shipments were delayed twenty-two hours at one place. It shows where the delays occur and the duration of them.

I hope there will be considerable done in this Province in the way of erecting storage and packing houses for fruit. This is a matter to which I have given a great deal of attention as regards the construction of suitable buildings, and I shall be glad to place any information in my possession at the disposal of the fruit-growers. We have conducted experiments at Ottawa in reference to materials and combinations of materials for cold storage purposes. The most effective insulating material we have found, considering cost and everything else, is ordinary planing mill shavings.

Q. Could shavings be used for ice storage?

Mr. RUDDICK: I have never used them for this purpose.

Q. Have you tested the qualities of various woods as regards insulation?

A. Spruce is ordinarily used because it has less odor than pine.

Q. I read that beech is the best wood to use for this purpose.

A. A great deal of unreliable information has been published on this subject as most of the work has been by companies who are interested in promoting a certain material for the purpose. We find that a twelve-inch space filled with shavings and double boards outside, will give just as satisfactory results as the same space with seven-ply lumber and a dead-air space between. It is better to fill the space with shavings than leave it as a dead-air space. The information that has been gathered on this subject will be published in the report of the Branch at the end of the year and we shall be prepared to give you the details of these experiments and any other information we have in regard to construction of this kind.

Mr. BUNTING: I wish to record my appreciation of the effort put forward by the Department of Agriculture at Ottawa in order to assist us in making a success of the St. Catharines shipment. The primary reason in making these experimental shipments was the desire of the Railway Commission to ascertain the best type of refrigerator car for the transportation of fruit. The heads of the several divisions heartily co-operated with us in the work, and I feel that we are under a deep obligation to them for the assistance rendered. I think that these experiments are fraught with important results in connection with the opening up of the western market to our fruit. I believe we are on the verge of very great improvements in our transportation service. It has been felt for years that we have been laboring under excessive burdens in this respect. During the past year or two some relief has been afforded, and as the report states, the attention of those best calculated to give relief has been drawn to the necessity for improvement in reference to equipment, despatch, and the charges levied for the service rendered. I have every reason to believe that this Association will by a continuance of its efforts succeed in ameliorating these difficulties to a large extent, and if our fruit growers will profit by the results of the investigations which are being made in connection with the handling and packing of fruit, and supplement the efforts of the transportation company in this respect, I think our fruit industry will be placed on a much more satisfactory basis than ever before.

Mr. RUDDICK: In reference to ice supplies for refrigerator cars, I took upon myself the other day to write to the Superintendent of the C. P. R., pointing out that the supply of ice at North Bay had not been adequate during the present season and that, in view of the fact that shipments in the West would probably increase in 1906, it would be necessary to put up an additional supply this winter. If any of the shippers have any complaints to make in regard to the shortage of ice at any point, I should be glad if they

would acquaint me with them. We are paying the railway companies something like ten thousand dollars a year for the refrigerator car service and we are, therefore, able to approach them on such matters. I have no doubt they will be ready to adopt any suggestion that may be made.

Mr. BUNTING: I should like to say that information received from a gentleman who accompanied a car to the Northwest is to the effect that the icing facilities at North Bay and west are very crude indeed, and that considerable delay frequently arose on that account. I think, therefore, it would be quite in order if Mr. Ruddick would investigate that matter, and suggest to the railway authorities that some improvement should be made.

Mr. RUDDICK: I shall be glad to do that. Mr. Carey mentioned that fact in his report on the shipment.

Mr. WEBSTER: I am glad that the report refers to the necessity of placing express companies in charge of the Railway Commission. It is a very important matter where I live. It was pointed out yesterday that people living in certain points in Northern Ontario could bring fruit from the United States and get it cheaper, after paying the duty, than they could bring it from Southern Ontario owing to the heavy express charges. This is not a proper state of affairs, and I think that continued pressure should be brought to bear on our representatives at Ottawa until the desired result is accomplished.

W. W. MOORE, Extension of Markets Branch, Ottawa: In reference to transportation of fruit across the Atlantic, I should like to call the attention of the Association to the fact that this year thousands of dollars were lost to the fruit-growers and shippers through the bad condition in which apples have been landed in the Old Country. There was a shipment which left Montreal on October 6th by S.S. Bavarian, consisting of 28,000 barrels of apples, which was the largest single shipment that ever left that port. The vessel reached its destination at Liverpool on the 15th of that month. According to the report received from Montreal, the temperature of the sheds averaged 62 degrees, while the temperature of the barrels taken by the Inspectors ran from seventy degrees to eighty degrees. The Fruit Inspectors examined one hundred and five lots. Thirteen were reported to be in poor condition and twelve in a heated condition, this being equal to twenty-four per cent. that went aboard the vessel in bad shape. When the steamship arrived at Liverpool, our Inspector reported upon the condition of the shipment as follows:—"This cargo of apples was in poor condition. They had been heated. Many of the Snows, Colverts, Greenings, etc., were badly spotted and many of the 20 Oz. Blenheims, King-Pippins, etc., were bronzed or "scalded." Many were slack and a big percentage slightly wet and wet. Package good."

In the first four days sales by J. Adam, Son & Co. and Woodall & Company, 13,444 barrels were sold. Of this number 5,817 barrels, or forty-three per cent., were tight; 4,093 barrels, or thirty-one per cent., were slack; 1,495 barrels were slightly wet; 1,438 were wet; 416 were both slack and wet, and 140 were wasty or worthless. This makes a total of twenty-six per cent. that were more or less slack, wet and wasty. The prices received were in accordance with the above and were as follows:

Snows	Tight,	15/	Slack, 7/6	Slack and wet,	3/
Baxter	"	21/		" "	6/
Greening...	"	15/6		" "	6/
Baldwin ...	"	17/9		" "	5/6
King	"	21/6		" "	6/

The point I wish to make is that the analysis showed that twenty-four per cent. of the fruit went on board the steamer in bad condition and that twenty-six per cent. came out on the other side in bad condition. The best ventilation system that can be conceived of will not turn out apples in good condition when they go aboard heated or spoiled; so that it is up to the grower to see that the fruit is in good shape when it goes on board.

A MEMBER: With reference to this shipment it should be borne in mind that we had abnormally warm weather about the time the shipment was made, which was probably the reason for the high temperature of the fruit.

Mr. TWEDDLE: Was there any provision made for the ventilation of the barrels? Our practice is to bore holes in the barrel with a view of keeping them cool. That has been our custom for the past two or three years when shipping in warm weather.

Mr. MOORE: I think that is a good idea. I do not think there was any such provision in this case and as a matter of fact, we see very few barrels where provision is made for ventilation.

Mr. LICK: Is there any effort made to provide heated cars for the winter transportation of fruit? I am informed by a gentleman in Maine that they have no difficulty in getting heated cars.

Mr. RUDDICK: The C.P.R. undertake to supply heated cars for shipments out west. The heating is done with a coal-oil stove, that is to say, it is an ordinary refrigerator car with a lamp added. I think these cars could be procured down here. I cannot say how really efficient they are. Occasionally, I believe, a lamp goes out and causes some difficulty on that account.

Mr. MCNEILL: These cars are not in sufficient number here in winter time to meet requirements, and I have known cases where through the explosion of the lamp the fruit has been much damaged by coal-oil smoke.

Mr. MOORE: They use them largely in Nova Scotia, and on the whole they appear to give satisfaction.

A resolution adopting the report was then carried.

TRANSPORTATION AND MARKETS.

By J. A. RUDDICK, DEPARTMENT OF AGRICULTURE, OTTAWA.

I do not appear before you this afternoon as an expert in fruit growing, but I have some interest in this great industry, especially where it touches the questions of transportation and marketing. With these subjects I have had a great deal to do for a number of years past. I have listened to the discussions here with a great deal of interest, particularly to the remarks on co-operation, because I believe there is a great future before that line of effort in connection with the fruit industry, and that it will do much to assist it, just as it has assisted the dairy industry. During a recent trip to Great Britain and Europe. I had an opportunity of looking into co-operation, especially in Denmark. In that country they have carried the work farther than in any country of the world to-day, and the results are most gratifying. In Denmark the work embraces the three great products of the country, butter, bacon, and eggs, and they have succeeded in producing enormous

quantities of these commodities considering the area of the country, and put on the market a very excellent article. In this connection I may say that I was able a few months ago to publish a report on some phases of dairying in Denmark, and among them is included a description of the co-operative movement. If any of your members would care to secure a copy of this report, I shall be glad to send it to them. I should like to see it read by everyone who is interested in the work of co-operation, because there is no doubt that the Danes have been very successful in that line, owing largely to some of their native characteristics which perhaps we have not got to the same extent; but I believe that a study of the conditions of success there will be of use in this country.

I also listened with interest to Mr. Macoun's statements in regard to fruit growing in Ireland, and I agree with what he says as to the possibility of competition from that source. I spent three days with a fruit expert of the Department of Agriculture of Ireland, and I believe that if their plans materialize, they will prove important competitors. I am not prepared to say anything about the quality of their apples, because I do not know whether they have sufficiently proved that or not. I saw fine early dessert apples selling in Ireland last autumn at 14 S. a dozen. But for fruit of this kind there would of course be but a limited demand.

We have in dairy products very strong competition from this source. I was amazed at the quantity of butter produced there, the value of which reaches thirty million dollars annually.

While I was there I took occasion to visit some of the leading markets in Great Britain, just as did Mr. Sherrington. I visited some of the salerooms he speaks of and my conclusion was the same as his that it was difficult to understand with the noise and confusion which prevailed and the rapidity with which sales were made how business could be successfully conducted. Mr. Sherrington referred to the fact that Canadian products were not sold in those markets as Canadian. I was struck with that fact when visiting the retail establishments. I saw great quantities of Canadian produce but as a rule there was no mark upon it to indicate where it came from, with the exception of cheese and also of butter in some instances. There are, however, some difficulties in the way of indicating this, and so far as I could ascertain, it made no particular difference so long as the quality was right. I am not considering methods of selling or handling. The great mass of consumers in Great Britain do not care where the stuff comes from. With dairy products in particular, the difficulty exists that they come from so many different parts of the earth. On one day a man will be selling butter from Siberia, the next day from Ireland, and the next from Denmark, Canada or somewhere else, and it is impracticable for him to differentiate. I do not think there is much to be gained by trying to advertise, among the consumers, the country of origin of these products. The man who deals in the product is the one to get at.

As to selling our products to retailers, I am not sure that I would recommend that method, and believe that the plan of selling f.o.b. here would be more successful on the whole. I happened to be the means of sending the man to Canada that Mr. Johnston spoke of last night. I met Mr. Idiens in London, and he was then considering the advisability of sending his son over to purchase apples, and I gave him a letter of introduction to Mr. McNeill.

REPORT OF TRANSPORTATION COMMITTEE.

By W. H. Bunting, St. Catharines.

Gentlemen,—Your committee on Transportation begs to report as follows.

The past season has been one in which the volume of fruit more especially with reference to peaches and plums has been largely in excess of the year 1904. In fact with the single exception of apples, the same may be said of nearly all fruit grown in the Province of Ontario.

This has been the case to such an extent that it has at times taxed the ability of the railway companies to move all the perishable fruit that offered, more especially during the past two months. The situation became so critical at one time that your committee was forced to appeal to the Railway Commission, presenting the claims of the fruit growers and asking that provision be made for reasonably prompt handling of fruits which are of such perishable nature. We have reason to believe that this appeal was not without results.

There is still, however, a great lack of equipment suitable for the carriage of fruit on all the railways doing business in Canada. While the Refrigerator Car service is fairly good when the cars can be obtained, and an icing station is near the shipping point, it is often extremely difficult to secure these cars when required and considerable loss and disappointment has arisen during the past season from this very cause. Such a thing as a thoroughly efficient, ventilated car is not to be had outside of the refrigerator system which cars may be used for this purpose by fastening open the ice hatches.

A series of investigation has been instituted under the auspices of the Railway Commission for the past twelve months with the purpose of ascertaining what type of ventilated car is likely to be most suitable for this service and no doubt some recommendations will be made to the railway companies based on the results of these investigations. It is to be hoped that something may be granted in this respect before long.

Your committee is still of the opinion that a reduction in the rate of carriage of apples should be made, as the rate at present in force is considered excessive.

The express companies have had a very prosperous season as far as the fruit trade is concerned and it is felt by your committee that the time has come when a material reduction in express rates on fruit must be made. While the railway companies have to some extent recognized the justice of the claim of the fruit growers for a reduction in rate by freight service, the express companies have stood firmly to their guns, and continued in many instances to absorb by far the greater portion of the gross sales of large quantities of fruit. Your committee would urge this Association to bring all possible pressure to bear to have the express business brought under the control of the Railway Commission.

Your committee desire to state most emphatically that at no time in the history of the fruit trade of the Province have the railway authorities and officials taken a deeper interest in the question of the satisfactory transportation of fruit than during the past season. This fact augurs well for the prosperity of the trade in the future. We would urge upon the members of this Association to supplement by every available means the efforts of the railway companies to handle our shipments in a satisfactory manner.

APPENDIX "A."

PACKING HOUSES AND CO-OPERATION FOR FRUIT GROWERS.

By Prof. J. B. Reynolds, Ontario Agricultural College, Guelph.

Last year in connection with my investigations in cold storage, I superintended an experimental shipment of fruit from St. Catharines and Grimsby to Winnipeg. The report of this shipment has appeared in Bulletin 139. One of the principal conclusions from this experimental shipment is that in order to command the markets, and gain and hold the confidence of fruit dealers, and consumers, general co-operation among fruit growers is essential. First, in order that a continual supply of fruit in succession may be forwarded to the various markets in quantities and varieties such as the market may demand. A single grower is unable to fulfil this condition, but a community of growers shipping together will be able to supply, in succession and quantity, the varieties demanded. Secondly, for the purpose of packing. There are some Fruit Growers' Associations in Ontario who ship in co-operation and pack separately. The result of this packing is lack of uniformity in grading. Apart altogether from honesty of intention, no two men in different orchards can have exactly the same standard of excellence. As a consequence, fruit marked No. 1 from different orchards shipped in the same car will unavoidably vary both in size and in quality. This lack of uniformity is one of the most serious drawbacks in the Ontario fruit business, and I am satisfied that the only way to secure uniformity is to have all the fruit shipped by the Association packed in one place and under one management. Thirdly, for purpose of shipping and marketing, for the securing of cars, of obtaining favorable rates from the car companies; and for making a sufficient impression on the market. Further, co-operation in shipping will ultimately enable the growers to deal directly with the purchasers without the intervention of commission men. This will be accomplished when the purchaser can rely absolutely on the marking on the package. So long as the purchaser requires to examine his fruit before buying, fruit must be shipped to take its chances with the market, but so soon as the buyer may know that the mark on the package truly represents the quality of the goods contained therein, just so soon may the seller quote prices f.o.b., and thus dispense with sales on commission. For example, Mr. W. H. Owen, Manager of the Gypsum Fruit Co., Gypsum, Ohio, informs me that not only does he quote his own prices for the fruit shipped by his company, but the purchaser of that fruit, the wholesale dealer, resells it previous to the receipt of the goods. This manner of business implies absolute confidence in the quality of the goods,—confidence that goods marked No. 1 shall be No. 1 without exception, and that goods marked No. 2 shall be No. 2. When this feeling of confidence exists between shipper and purchaser, the goods shipped need not long take its chance on the market. I am convinced that the shipper will not be able to quote prices until this confidence is established through co-operative packing.

Co-operative packing in Ontario is making very satisfactory progress. Mr. A. E. Sherrington, of Walkerton, has been indefatigable in assisting to organize various associations in the different parts of the Province. Mr. Sherrington addressed meetings at a number of places where it was intended to organize associations, and by his experience and enthusiasm he succeeded in giving these enterprises in most places a good start. Among others, associations have been organized at Sparta, Clarkson, Burford, Ilderton,

Thedford, Bloomfield, Oakville, Thornbury, Forest, Owen Sound, and Walkerton.

I have not a complete report as to what has been done at all of these places. At Oakville the association is in operation this year. A report of what is being done there appeared in the November number of *The Horticulturist*, and the Manager speaks with much gratification of the success of their business. At Forest last year thirty-eight cars of apples were shipped west. Perfect satisfaction was given, and one purchasing company stated that if they would pack under the same system this year, this company would handle their whole output. From Thornbury Mr. J. G. Mitchell writes that they have an excellent packing house with all the appointments up to date. The shipping part of the business, as well as the financial part, he reports in first-class working order. At Walkerton, under Mr. Sherrington's management, while only a small organization is there, last year fifteen cars were shipped,—one-half of which went west. Eight hundred barrels of apples were sent to Scotland. This year, owing to the scarcity of apples in that district, no business is being done by the Association.

Besides inquiring about the work in Ontario, I have visited a number of places in the neighboring states, where co-operation is being carried on. On the western side of Michigan there are several co-operative associations, handling, principally, peaches. Among these are Fennville, Bangor, and Benton Harbor, all of which I visited. At these places the fruit in all instances is brought to a central packing house, and is repacked under the eye of the manager. In some instances, fruit is sold f.o.b., prices being quoted according to the local ruling; in others the fruit is sold on commission. The best organized association that I visited on the other side is that at Gypsum, Ohio, under the management of Mr. W. H. Owen. This is a large association in the peach district, and peaches are the principal kind of fruit handled. The first year of the management, I think in 1900, 105,000 bushels of fruit were handled at the packing house in ninety days. Last year, 1904, 45,000 were handled. The day that I visited the packing house, the 5th September, eight cars of peaches were shipped out. The packing house with a full complement of labor can handle 5,000 bushels per day. This packing house is about 150 feet in length and 50 feet in width. Along the full length of the house runs the delivery floor. The packing floor is three feet lower than the delivery floor, and at the breast just below the delivery floor stand machine graders, which are used exclusively in grading the large fruits, such as pears, peaches, and apples. The peaches are graded by the machine into four grades, according to size, and at each basket which receives the different grades from the machine, an attendant stands to remove any unsound or imperfect samples which are not up to the required quality. The peaches are shipped mostly in bushel baskets, but partly in half bushel and quarter bushel baskets. The prices are quoted to the dealers and the fruit sold mainly to wholesale dealers in Boston, Philadelphia, Pittsburg, Cincinnati, and other large cities. When orders have not been received for the next day's packing, the manager usually sends out wires to his different customers stating the prices that will be ruling the next day on the different grades of fruit, and in this way he avoids the necessity of shipping on commission.

I append herewith extracts from the by-laws and business forms of the Gypsum (Ohio) Co-operative Association:

Objects. The object of this organization is for the sale of the fruits grown by its members, also to buy and sell such fruits during the season as opportunity presents.

Executive Committee. The directors may select not to exceed three of their number to act as an executive committee, (the President to serve as chairman of this executive committee) to have general charge of the affairs of the corporation during the fruit season. This committee shall order all purchases of supplies. The directors shall regulate the amount of compensation this committee shall receive.

Membership. Any fruit grower in district specified, shall be eligible to become a member by a two-thirds vote of the stockholders of record at the time the application is made, also a two-thirds vote of members shall determine the value of each share of the stock that such party shall pay into the treasury, if he or she shall be admitted as a member.

Meeting of Executive Committee. The executive committee, during the fruit season of each year, shall meet at least once a week, or oftener if the interests of the company shall demand it.

Fruit Delivered. All peaches, pears, plums, and quinces grown by each and every member of this company shall be delivered to the company's packing-house for grading, packing and shipment.

Grapes and other small fruits may be delivered to the company for sale or disposal, and shall be disposed of for the grower on a commission of one cent per basket.

Condition of Fruit. Each and every member shall pick his fruit in prime condition and deliver same promptly to the company's packing-house. In case green and immature fruit or overripe fruit, or windfalls be delivered by any member, same may be accepted and said member shall be credited with average price such fruit may bring.

Penalties. Each and every member shall have the right to give away such fruit of his own raising as he or she may elect; but shall not seek, solicit and make sales of fruit outside of the company, excepting windfalls and cull grades or any fruit that may not be accepted by the company. Any member so doing shall pay into the company's treasury the sum of fifty cents per bushel for all such fruits sold, excepting sales of aforesaid grades.

Credits and Expenses. All fruit delivered each day shall be credited to the person furnishing the same at the average price which fruit brought that day.

One-third of the amount so credited may be retained by the company until the close of the season for final settlement, and from the aggregate of the amounts so retained from each member there shall be at the end of the season, before paying the same over to the respective members of the company, be deducted all expenses and losses. All expenses of handling, packing and marketing fruit shall be borne by the several members of the company in proportion to the number of bushels of fruit with which each has been credited. All losses and rebates shall be deducted in proportion to the money credit of each member.

Following are forms of receipt and credit that are made out for each lot of fruit brought to the packing house:

Date, 1905.

Received from ....

..... Bushels Yellow Peaches, ungraded.

..... Bushels White Peaches, ungraded.

Other Fruits ....

.....

No. ..... Receiving Clerk.

Grade.	Carriers.	1.	½.	¼.	Total in bushels.	Price.	Amount.
AA Yel							
White							
A Yel							
White							
B Yel							
White							
C							
Total of peaches							
Culls.							
Other fruit							
Grader No.					Total credit	$	

Summary.

.....190

PEACHES.

Total bushels.		Av. per bus. $	Av. per bus. c.	Total. $	Total. c.
AA					
A					
B					
C					
Total bus. peaches ...		Total amount			

Total average peaches (all grades) .....per bushel

OTHER FRUITS.

Total bushels.		Av. per bus. $	Av. per bus. c.	Total. $	Total. c.
Plums					
Pears					
W. F					
Culls.					
Total bus all fruits exclusive of culls.					
Total credits all fruits .....$					

To balance Cr.

Date.		Items charged.	Amount.	
Total debits				

THE FOREST FRUIT-GROWERS AND FORWARDING ASSOCIATION.

This association was organized and commenced business in 1904 with seventy-five members. This year, 1905, the membership has been reduced to thirty, principally by the operation of a by-law requiring all members

of the association to spray their orchards four times during the season. The secretary reports a good crop of clean fruit among the members of the association, while generally in that district the crop is inferior. Last year most of their fruit was sold to Winnipeg and Brandon dealers, and with such good satisfaction that the same dealers wished to buy all the output this year and orders were received from the west for 25 or 30 carloads. Being anxious, however, to establish a British trade, the association this year sold the bulk of their fruit to an English buyer. Practically all the fruit thus far has been sold at the packing house.

The association have not as yet built a packing house, but have rented a large curling rink in Forest. The ungraded fruit is delivered at one end of the large floor space, the grading and packing done at the middle, and the packed fruit stored at the other end. There are, as yet, no cold storage facilities here, nor have these been needed by the class of apples so far handled.

The district of Forest is situated within five miles of Lake Huron, and is thus favorably placed for fruit growing. In fact in its climatic features it is very similar to the Annapolis Valley in Nova Scotia. The President, Mr. Daniel Johnson, has an orchard of 30 acres bordering on the shore of the lake.

Both the president of the association and the secretary, Mr. Andrew Lawrie, when I visited them, felt highly gratified with the success so far achieved, and especially with the very prompt recognition, by the buyers, of the superior quality and uniformity of their goods. They hope to have a cold storage, and possibly a packing house of their own, in the near future; although they think so far as a packing house is concerned, what is required is a building of requisite shape—oblong; plenty of floor space for working and storing; a place for storing packages; and nearness to the railway track. Most of these requisites they find in the building at present used, and as the rent is reasonable, they are in no hurry to build.

The Georgian Bay Fruit-Growers' Limited.

The fruit-growers in that part of the Georgian Bay district surrounding Thornbury have organized a company for the purpose of packing and disposing of the fruit grown in that district. This company has a feature that is somewhat unique in farmers' co-operative concerns; it has been organized into a joint stock company, with a Provincial Charter authorized to pack, buy and sell fruit, and to erect packing houses and storage houses. The shares of the company are held at twenty-five dollars each, and thus far there are about one hundred and thirty shareholders in the company. A building has been erected this fall, and already about seven hundred barrels of apples have been packed and shipped to Liverpool. About three hundred barrels were held in the packing house, and it is the intention of the company to keep this fruit, consisting entirely of winter varieties, until late in the winter.

The packing house was commenced about the first of August and by the first of December was practically completed. It is a building 100 feet in length and 40 feet in width, consisting of a basement 9 feet high and a storage and packing house 13 feet high, and above this a garret. The basement, as well as the storage house above are intended for winter storage. These two together have a capacity of about 5,000 barrels. The ground floor is divided into two parts, one part about 25 x 40, consisting of the packing house proper; the other part about 75 x 40, consisting of the storage house.

The garret above when used will contain empty packages. The walls are constructed of concrete ten inches thick, and from the ground floor up to the first floor, the wall is insulated by four inches of planer shavings, held in place by inch lumber tongued and grooved. The whole building is well lighted, and the windows of the storage house have been provided with double sash and close fitting wooden shutters, so that it is hoped the temperature can be kept above freezing point. For ventilation, two large flues, one near each end of the building, have been provided, running from the basement ceiling to the garret, and extending some six feet above the garret floor. As these flues pass through the storage chamber, slides are provided which may be opened or shut as desired for change of air in the storage chamber. When the windows in the basement are opened, a strong current of air passes up these flues and effects a rapid change of air and affords a means for controlling the temperature of these chambers.

The building is situated close to the freight sheds of the railway at Thornbury, these two buildings being connected by a platform. Fruit may be delivered at one side of the building, packed and passed through to the platform on the other side, and loaded immediately on the cars; or, if it is to be held, it may be run into the storage room or carried to the basement.

A number of the members of this Joint Stock Company have purchased a small cooper shop in the town and have manufactured their own barrels this season, at a cost of twenty-seven cents per barrel. It is the intention to place the manufacturing of barrels under the control of the company.

Thus far fruit has been consigned to commission agents in Liverpool, but the company will likely in the near future sell direct to dealers. A commendable feature of their business transactions is the arrangement whereby their members may be advanced part of the value of the fruit stored in the building. It was felt that there would be difficulty in inducing all the members concerned to hold the fruit until a later and more favorable opportunity for selling. Accordingly, arrangements have been made with the bank for advancing to the owners of the fruit one dollar per barrel.

Mr. J. G. Mitchell, the energetic manager of this company, is very hopeful regarding the outcome of this experiment. He claims that the joint stock company feature has two advantages over the mere co-operative association; first, the members have a financial interest in the success of the concern apart from the mere picking and selling of their own fruit. This constitutes a bond of union, and it is claimed members are less likely to withdraw from membership or to sell their fruit elsewhere. Secondly, by the selling of shares, money is provided for capital expenditures, such as the erection of packing houses, storage houses, and cooper shops. The company expect next year to erect an ice cold storage to aid them in handling their summer and early fall fruits, the present insulation storage being adapted only for winter storage.

Cold Storage and Co-operation.

In my inquiries on the subject of packing houses, I do not find much attention given to cold storage as a factor of the business, that is to say, buildings constructed for the purpose of cooling the fruit by means of ice or some other refrigerant. There are storage houses, such as the one at Thornbury, intended for winter storage. But in most of these districts, if not in all, there must be a considerable quantity of summer and early autumn fruits which are very perishable and which seem to require some cold storage facilities to complete the arrangements. At these places there

are at least plums and pears and early apples to be handled. In the Niagara and Lake Erie districts there are other tender fruits, such as grapes and peaches. Unless these can be packed, loaded, and shipped within a few hours after picking, some arrangement for cold storage seems to be advisable. Most of the co-operative associations realize this and intend in the near future to construct a cold storage of some kind. At St. Catharines a first rate cold storage of the mechanical pattern has been in operation for some years. Mechanical refrigeration, however, is not generally advisable, since it is very expensive in the first cost and expensive in operation as compared with ice. Where ice storage will give a desired temperature, the latter is to be preferred. It is not necessary here to go into details by way of recommending any particular plan for cold storage. I may say, however, that I have given considerable attention to this question, and shall be glad to assist co-operative associations in the preparation of plans to suit their special purposes.

In the above report I have dealt more particularly with the co-operative associations that have been more recently established. There are other associations in Ontario that have been established for some time and that have been during that time sufficiently before the public not to require any detailed account here. Of these associations, I might mention the Burlington Fruit Growers' Association and the St. Catharines Cold Storage and Forwarding Company. Both these companies have been organized for some time, and, while so far as I know they have not attempted any packing in co-operation, they have co-operated for the purpose of marketing their fruit. The Burlington Fruit Growers have been selling their fruit as an association for some years. This year the St. Catharines Association have followed up the experimental shipment made last year from St. Catharines and Grimsby, and have shipped a large quantity of fruit in carload lots by freight to Winnipeg. A report of these shipments was given at the Fruit Growers' Convention recently held in Toronto.

After looking over the whole field in its varied aspects, including packing, storing, and marketing, it seems to me that in order to command the situation to the best advantage either a co-operative association or a joint stock company is necessary, and also a packing house of suitable arrangements and dimensions, and situated at the railroad, is highly advisable if not absolutely necessary. As to the construction of the packing house, when I commenced my inquiries, I was inclined to think that a specially constructed house would be desirable. Now, however, I am inclined to recommend that no special features are necessary in packing houses, so far as internal arrangements are concerned. It should be long and relatively narrow, so that the ungraded fruit may be unloaded at one end, the grading may be done at the centre, and the graded fruit at the other end be adjacent to the railway platform. Beyond that, so far as packing houses are concerned, there are no special features.

Next, as to storage houses, it seems that winter fruit should generally be held by the owners if the best ultimate results are to be reached. If green stuff is put on the market, it makes an unfavorable impression and the grower or packer should be the best judge of the fitness of fruit for the market. At the packing house, therefore, I advise that the fruit should be held until it is ready for use. In order to do this winter storage will be necessary, that is to say, a building or part of a building with well insulated walls provided with ventilation. I think that the construction of the building I described above, belonging to the Georgian Bay Fruit Growers', is one to be recommended.

APPENDIX "B."

By-laws of the ——— Fruit Growers, Limited. Incorporated under the Act to provide for the Incorporation of Cold Storage Associations of the Province of Ontario.

1. This Association of fruit growers shall be known as the
Fruit Growers, Limited.

2. The purpose of this organization is for the packing and selling of the fruit grown by its members, also buying and selling such other fruit during the season as opportunity presents itself.

3. The capital stock of the company shall be in shares of the sum of ten dollars. No member shall hold more than twenty shares.

4. The annual meeting of the Company shall be held on the first Thursday in May in each year.

5. Special meetings of the stockholders may be held at any time upon call of the President by written notice mailed to each stockholder five days before the meeting. Special meetings shall also be called by the President whenever required to do so in writing by one-tenth part in value of the shareholders of the company.

6. At any meeting of the Company, a one-half representation of the stock either in person or by written proxy shall constitute a quorum for the transaction of business.

7. At the annual meeting of the Company, five Directors shall be elected of whom three shall constitute a quorum at any board meeting.

8. The officers of the Company shall consist of a President, Vice-President, Secretary-Treasurer, Manager and two Auditors.

9. The President and Vice-President shall be chosen by the directors from among themselves at the first board meeting after the annual meeting. The other officers shall also be chosen at this time, but not necessarily from among the Directors.

10. All elections of the company shall be by ballot, plurality electing, conducted by two scrutineers appointed by the chairman. Each shareholder shall be entitled to as may votes as he owns shares in the Company.

11. The President shall preside at all meetings of the Company. He shall call meetings of the board of Directors and shareholders when necessary and shall advise with and render such assistance to the Manager as may be in his power. In his absence, the Vice-President shall have and exercise all rights and powers of the President.

12. The Secretary-Treasurer shall keep a record of the proceedings of all meetings and of all the receipts and disbursements, and report the conditions of the finances annually or as often as the Directors shall desire.

13. The Manager shall have charge of the business of the Company in detail under the supervision of the President.

14. The Manager and Secretary-Treasurer shall give bonds in such sums as shall be acceptable to the Company.

15. The Directors may select three of their number to act as an Executive Committee (the President to serve as chairman) to have general charge of the affairs of the corporation during the fruit season.

16. When a vacancy shall occur through any cause in any of the offices established by the by-laws of the Company, it shall be filled at the next regular or special meeting of the Company.

17. Any fruit grower in County or Township shall be eligible to become a member by a two-thirds vote of the stockholders at the time application is made.

18. Any member of this Company may withdraw at any time between January 1st and April 1st. Such notice of withdrawal must be given in writing to the President or Director of the Company.

19. All apples grown by the members of the company shall be delivered to the Company's packing house in prime condition for grading, packing and shipping. Other fruits may be delivered to the Company for sale on commission.

20. The books of the Company shall be audited before the date of the annual meeting each year. At this meeting a printed statement of the receipts and expenditures as audited shall be presented to each stockholder.

21. These by-laws may be amended at any regular or special meeting by a vote of the stockholders or stock present in the affirmative. Notice of such amendments must be given each shareholder by letter or otherwise at least five days previous to the meeting.

APPENDIX "C."

FRUIT PRIZE LIST.

HORTICULTURAL EXHIBITION, TORONTO, NOV. 13-18, 1905.

Apples. Class I.—Export or Foreign Market Varieties.

Barrels Ready for Shipment.

Baldwin. 1st, Biggs F. & P. Co. 2nd, E. Lick. 3rd, Chatham Fruit Growers' Association.
Ben Davis. 1st, Chatham F. G. A. 2nd, F. S. Wallbridge.
Greening. 1st, E. Lick. 2nd, Biggs F. & P. Co. 3rd, Chatham F. G. A.
King. 1st, E. Lick. 2nd, Biggs F. & P. Co. 3rd, Chatham F. G. A.
Russets. 1st, The Forest Fruit Growers' Association. 2nd, Chatham F. G. A. 3rd E. Lick.
Spy. 1st, C. W. Challand. 2nd, Biggs F. & P. Co. 3rd, Forest F. G. A.

Boxes Ready for Shipment (Fruit Unwrapped).

Baldwin. 1st, C. W. Challand. 2nd, E. Lick. 3rd, Chatham F. G. A.
Fameuse. 1st, J. B. Gutthrey. 2nd, A. D. Harkness. 3rd, H. Jones.
Greening. 1st, Biggs F. & P. Co. 2nd, E. Lick. 3rd, Chatham F. G. A.
King. 1st, E. Lick. 2nd, J. B. Gutthrey. 3rd, Biggs F. & P. Co.
McIntosh. 1st, A. D. Harkness.
Russet. 1st, Biggs F. & P. Co. 2nd, E. Lick. 3rd, J. B. Gutthrey.
Spy. 1st, C. W. Challand. 2nd, Biggs F. & P. Co. 3rd, N. Brown.

Boxes Ready for Shipment (Fruit Wrapped).

Fameuse. 1st, J. B. Gutthrey. 2nd, H. Jones. 3rd, A. D. Harkness.
Gravenstein. 1st, E. Lick.
King. 1st, E. Lick. 2nd, J. B. Gutthrey. 3rd, Biggs F. & P. Co.
McIntosh. 1st, A. D. Harkness.
Scarlet Pippin. 1st, H. Jones.
Spy. 1st, Biggs F. & P. Co. 2nd, J. C. Harris. 3rd, R. Thompson.
Wealthy. 1st, J. B. Gutthrey.

Class 2—Domestic or Home Market Varieties not Included in Class One, Barrels Ready for Market.

Gravenstein. 1st, E. Lick.
Any Other Variety. 1st, E. Lick. 2nd, J. B. Gutthrey.

Boxes Ready for Market.

Alexander. 1st, E. Lick.
Blenheim. 1st, J. B. Gutthrey. 2nd, A. R. Davison. 3rd, Biggs F. & P. Co.
Gravenstein. 1st, E. Lick.
Any other Variety. 1st, E. Lick. 2nd, W. H. French. 3rd, C. L. Stephens.

Class 3.

Any Three Varieties, Fall or Early Winter, Dessert. 1st, Biggs F. & P. Co. 2nd, W. C. Reid. 3rd, A. D. Harkness.
Any Three Varieties, Late Winter Dessert. 1st, C. W. Challand. 2nd, Forest F. G. A. 3rd, J. B. Gutthrey.
Any New Variety, Dessert. 1st, J. B. Gutthrey. 2nd, C. L. Stephens.
Any Three Varieties, Fall or Early Winter, Cooking. 1st, J. B. Gutthrey. 2nd, A. R. Davison. 3rd, C. L. Stephens.
Any Three Varieties, Late Winter, Cooking. 1st, N. Brown. 2nd, Forest F. G. A. 3rd, Biggs F. & P. Co.
Any New Variety, Cooking. 1st, W. M. Robson. 2nd, J. B. Gutthrey. 3rd, C. L. Stephens.

Class 5.

Collection, Six Varieties, Winter. 1st, C. W. Challand. 2nd, J. B. Gutthrey. 3rd, Forest F. G. A.

Class 6—Pyramids of Fruit.

Ben Davis. 1st, Chatham F. G. A. 2nd, J. L. Hilborn.
Baldwin. 1st, E. Lick. 2nd, J. B. Gutthrey. 3rd, Chatham F. G. A.
Gravenstein. 1st, E. Lick.
Fameuse. 1st J. B. Gutthrey. 2nd, A. D. Harkness. 3rd, H. Jones.
King. 1st, J. B. Gutthrey. 2nd, E. Lick. 3rd, Chatham F. G. A.
Spy. 1st, J. B. Gutthrey. 2nd, Biggs F. & P. Co. 3rd, A. R. Davison.
Scarlet Pippin. 1st, H. Jones.

PEARS.

Class 8—Any Three Varieties Correctly Named.

1st, C. E. Secord. 2nd, R. Thompson. 3rd, Biggs F. & P. Co. 4th, F. G. Stewart. 5th, W. H. Bunting.

Export Varieties, Half Cases Ready for Shipment (Fruit Wrapped).

Anjou. 1st, R. Thompson. 2nd, F. G. Stewart. 3rd, C. E. Secord.
Bosc. 1st, F. G. Stewart. 2nd, C. E. Secord. 3rd, R. Thompson.
Clairgeau. 1st, Biggs F. & P. Co. 2nd, F. G. Stewart. 3rd, R. Thompson.
Duchess. 1st, F. G. Stewart. 2nd, C. E. Secord. 3rd, W. H. Bunting.
Kieffer. 1st, F. G. Stewart. 2nd, C. E. Secord. 3rd, W. H. Bunting.
Lawrence. 1st, F. G. Stewart. 2nd, C. E Secord. 3rd, R. Thompson.

Class 10—Domestic Varieties, 11 qt. Baskets, Ready for Market.

Winter Nelis. 1st, R. Thompson. 2nd, F. G. Stewart. 3rd, C. E. Secord.
Any other Variety. 1st, R. Thompson. 2nd, W. H. Bunting. 3rd, N. Brown.

GRAPES.

Class 11—For the Best Six Bunches Correctly Named of each of the Following Varieties.

Agawam. 1st, R. Thompson. 2nd, F. Sinnett. 3rd, F. G. Stewart.
Concord. 1st, F. Sinnett. 2nd, W. H. Bunting. 3rd, F. G. Stewart.
Lindley. 1st, F. G. Stewart. 2nd, R. Thompson. 3rd, W. M. Robson.
Niagara. 1st, F. G. Stewart. 2nd, W. H. Bunting. 3rd, F. Sinnett.
Vergennes. 1st, F. G. Stewart. 2nd, R. Thompson. 3rd, C. E. Secord.

Wilder. 1st, R. Thompson. 2nd, F. G. Stewart.

Black, 9 lb. Basket. 1st, R. Thompson. 2nd, F. G. Stewart. 3rd, F. Sinnett.

Red, 9 lb. Basket. 1st, F. G. Stewart. 2nd, R. Thompson. 3rd, W. H. Bunting.

White, 9 lb. Basket. 1st, W. H. Bunting. 2nd, R. Sinnett. 3rd, F. G. Stewart.

Black Grapes, Crate. 1st, W. H. Bunting. 2nd, R. Thompson. 3rd, C. E. Woolverton.

Red Grapes, Crate. 1st, W. H. Bunting. 2nd, R. Thompson. 3rd, F. G. Stewart.

White Grapes, Crate. 1st, W. H. Bunting. 2nd, R. Thompson. 3rd, F. G. Stewart.

Collection of Hot-house Grapes. 1st, John Chambers.

Hot-house Grapes, Two Bunches, White. 1st, John Chambers.

Hot-house Grapes, Two Bunches, Black. 1st, John Chambers.

Class 12—Collection by Association or Society. 1st, St. Catharines Cold Storage Co. 2nd, Norfolk Union Fair. 3rd, Chatham Fruit Growers' Association. 4th, Orillia Horticultural Society. 5th, Leamington Horticultural Society.

Preserved Fruit.

Class 13—One Quart Sealer of Canned Fruit of Each of the Following Varieties.

Cherries, Black. 1st, Mrs. A. M. Smith. 2nd, Mrs. R. Thompson.

Cherries, Red. 1st, Selkirk Women's Institute. 2nd, Miss Douglas. 3rd, Mrs. Emory.

Cherries, White. 1st, Mrs. A. E. Sherrington. 2nd, Mrs. H. Thompson. 3rd, Miss Douglas.

Gooseberries. 1st, Mrs. L. A. Brown. 2nd, Mrs. Hutt. 3rd, Mrs. Thompson.

Grapes, Red. 1st, Mrs. Thompson. 2nd, Mrs. Smith

Grapes, White. 1st, Mrs. Thompson. 2nd, Mrs. Hutt.

Grapes, Black. 1st, Mrs. Thompson.

Peaches, White. 1st, Mrs. Shuttleworth.

Peaches, Yellow. 1st, Mrs. Bunting. 2nd, Mrs. Sherrington. 3rd, Mrs. Hutt.

Pears. 1st, Miss Douglas. 2nd, Mrs. Hutt. 3rd, Mrs. Smith.

Plums, Red. 1st, Selkirk Women's Inst. 2nd, Miss Douglas. 3rd, Mrs. French.

Plums, Yellow. 1st, Mrs. French. 2nd, Selkirk Women's Inst. 3rd, Mrs. Hutt.

Raspberries, Red 1st, Mrs. Thompson. 2nd, Mrs. Hutt. 3rd, Mrs. Emory.

Raspberries, Black. 1st, Mrs. Thompson. 2nd, Mrs. T. Hammond. 3rd, Mrs. Shuttleworth.

Strawberries. 1st, Mrs. French. 2nd, Mrs. F. G. Stewart. 3rd, Mrs. Smith.

Class 14.

One Pint Sealer of Jam of Each of the Following Varieties.

Black Currant. 1st, Mrs. A. N. Broddy. 2nd, Mrs. Shuttleworth. 3rd, Mrs. L. Woolverton.

Peach. 1st, Mrs. Thompson. 2nd, Mrs. Hutt. 3rd, Mrs. C. E. Woolverton.

Pear. 1st, Mrs. Thompson. 2nd, Mrs. Hutt. 3rd, Mrs. C. E. Woolverton.

Plum. 1st, Mrs. C. E. Woolverton. 2nd, Mrs. Emory. 3rd, Mrs. Thompson.

Raspberry. 1st, Mrs. Shuttleworth. 2nd, Mrs. Broddy. 3rd, Mrs. Hutt.

Strawberry. 1st, Mrs. Stewart. 2nd, Mrs. Woolverton. 3rd, Mrs. Thompson.

Class 15.

One Half-pint Jar of Jelly of Each of the Following Varieties.

Apples. 1st, Mrs. Hutt. 2nd, Selkirk Women's Inst. 3rd, Mrs. C. E. Woolverton.

Crab Apple. 1st, Mrs. Hutt. 2nd, Mrs. Thompson. 3rd, Mrs. Bunting.

Red Currant. 1st, Mrs. Hutt. 2nd, Mrs. L. A. Brown. 3rd, Mrs. Thompson.

Grape. 1st, Mrs. Hutt. 2nd, Mrs. C. E. Woolverton. 3rd, Mrs. Thompson.

Quince. 1st, Mrs. C. E. Woolverton. 2nd, Mrs. J. L. Hilborn. 3rd, Mrs. Bunting.

Class 16.

Grape Juice. 1st, Mrs. Bunting. 2nd, Mrs. Stewart. 3rd, Mrs. Thompson.

Class I—Special.

Cherries, Peaches and Strawberries. 1st, Mohawk Women's Inst. 2nd, Selkirk Women's Inst. 3rd, Burlington Women's Inst.

Pears, Plums and Raspberries. 1st, Burlington Women's Inst. 2nd, Mohawk Women's Inst. 3rd, East Elgin Women's Inst.

Apples, Best Collection. 1st, Selkirk Women's Inst. 2nd, Mohawk Women's Inst.

COUNTY EXHIBITS.

Class 17—Hastings.

Export Varieties. 1st, Lewis Miles. 2nd, W. C. Reid.
Domestic Varieties. 1st, W. C. Reid. 2nd, L. Miles.

Class 18—Bruce.

Export Varieties. 1st, W. A. Rowand.

Class 19—Kent.

Export Varieties. 1st, C. J. Ross. 2nd, Chatham F. G. A.
Domestic Varieties. 1st, Chatham F. G. A. 2nd, C. J. Ross.

Oxford.

Export Varieties. 1st, J. C. Harris.
Domestic Varieties. 1st, J. C. Harris.

Lambton.

Export Varieties. 1st, J. Atkin. 2nd, Forest F. G. A.
Domestic Varieties. 1st, J. Atkin.

Lincoln.

Export Varieties. 1st, C. E. Secord.
Domestic Varieties. 1st, C. E. Secord.

Class 20—Leeds & Grenville.

Alexander. 1st, Wm. Beddie. 2nd, J. Warner.
Baxter. 1st, Ed. Keeler. 2nd, J. Warner.
Canada Red. 1st, J. Warner. 2nd, Wm. Beddie.
Fameuse. 1st, J. Warner. 2nd, Wm. Beddie.
McIntosh Red. 1st, Wm. Beddie. 2nd, H. Jones.
Golden Russet. 1st, Wm. Beddie. 2nd, H. Jones.
Scarlet Pippin. 1st, Wm. Beddie. 2nd, J. Warner.
Scott's Winter. 1st, Wm. Beddie. 2nd, H. Jones.
Wealthy. 2nd, Ed. Keeler.
Any other Variety. 1st, Ed. Keeler. 2nd, H. Jones.

Class 21—East Simcoe.

Section I. 1st, C. L. Stephens.
Section II. 1st, C. L. Stephens.
Section III. C. L. Stephens.
Section V. C. L. Stephens.

Class 22—Ontario.

Export Varieties. 1st, W. H. Stevenson. 2nd, E. Lick.
Domestic Varieties. 1st, E. Lick. 2nd, W. H. Stevenson.

APPENDIX "D."

DIRECTORS' REPORTS FOR SEASON OF 1905.

1. *What fruits were injured last winter, and to what extent?*

In the eastern counties, reports state that no injury worth noting was done. Cherry buds as is expected, suffered, and the buds of European and Japan plums. These fruits are considered tender there. Trees injured during the winter of 1903-4 are still dying off in considerable numbers.

In the central, western and northern counties, the reports are also favorable. Mention is made of continued evidence of the severe winter of 1903-4. Respberries and strawberries suffered in a few cases, and in the Guelph section, pears, plums and cherries are reported as damaged to the extent of twenty-five per cent. Peach buds suffered at Leamington.

2. *How much planting was done in your district, and were any varieties planted more largely than others?*

Reports from the extreme eastern sections show the average amount of planting of apples, chiefly, Fameuse, McIntosh and Wealthy. Along Lake Ontario, the export varieties of apples, such as Stark, Ben Davis, Baldwin, Spy and Ontario were set out in about the usual quantity. In the Niagara district, peaches and grapes were reported as being pretty largely planted. Peaches, cherries and raspberries seem to be still the favorites throughout the tender fruit districts. Peaches are being replanted in the Leamington section again. Otherwise in the West and North not much planting is being done.

3. *What were the most injurious insects of the year, and how much injury did they do?*

Codling moth, oyster-shell bark louse and curculio are mentioned, but injury was not very serious in the East, except from worms in light-bearing orchards. In the central, western and northern sections, the codling moth was reported as very bad, specially in unsprayed orchards. Owing to the light crop of apples in these parts of the Province, the proportionate amount of damage from this insect seems larger than usual. Some reports state that from one-half to one-eighth of the crop was worm-eaten. The San Jose scale is mentioned in the Niagara district as one of the most troublesome pests in the peach, plum and pear orchards, while the tent caterpillar seems to have done some damage further west.

4. *What diseases were most injurious this year, and to what extent did the apple spot fungus occur?*

In the eastern apple sections, there was practically no apple scab present. Along the St. Lawrence, however, the scab developed very rapidly on Fameuse, McIntosh, and Scarlet Pippin during the month of August, injuring fifty per cent. of the crop. In other sections, the scab was present to a greater or less degree. Most injury was done along the Lake Erie and Georgian Bay counties. Among the tender fruits, the cherry and plum suffered badly from rot. Twig blight is mentioned as spreading in the Guelph section.

5. *Give a list of the varieties of apples you recommend for your district.*

For the Eastern counties along the St. Lawrence and Ottawa Rivers, the following list is preferred:

Alexander.	McIntosh.	Transparent.
Baxter.	Milwaukee.	Wealthy.
Canada Baldwin.	Northwestern Greening.	Wolf River.
Duchess.	Scarlet Pippin.	Fameuse.
Scott's Winter.		

Along Lake Ontario, the following varieties are mentioned:

Baldwin.	Golden Russet.	Greening (Rhode Is.)
Ben Davis.	Hubbardston.	Wolf River.
Blenheim.	King.	Wealthy.
Duchess.	Ontario.	Stark.
Fameuse.	Seek.	Spy.

With the exception of Ben Davis, the above list is suitable for Western Ontario. The following additions are mentioned: Newton, Ribston, Mann, Tolman and Transparent.

For the Lake Simcoe District, the following are recommended to be top-grafted: Baldwin, Greening, King, Ontario and Spy. Additional varieties mentioned are Alexander, Ben Davis, Colvert, Duchess, Fallawater, Gano and Wolf River.

6. *Were the crops of apples, plums, etc., light, medium or good on the whole?*

In the extreme east, all crops except cherries are reported good. Along Lake Ontario, the main crop, apples, is reported light to medium. Other fruits light or a failure except small fruits, which are generally good. In the Niagara district, reports state peaches, good; plums (Japan), good, (others) light to medium; cherries, light; pears, light to good; apples, light; strawberries, light; grapes, medium to good. In other sections, plums are given as a good crop, apples light, strawberries good.

7. *Are there any varieties of fruit, not generally grown that you would recommend for your district?*

The Herbert raspberry is reccommended for more general planting. The Milwaukee and Northwestern Greening seem worthy of extended planting as hardy varieties in the east and north. All varieties of grapes should be planted along the Lake Erie shore for general trial.

In regard to this question, the general concensus of opinion seems to be that greater attention should be given to improving the quality of fruit from the varieties that are already extensively planted.

8. *Give notes and results from spraying this year.*

Spraying is not extensively practised in the eastern part of the Province. Where the Fameuse type of apple is the favorite, greater precautions will be necessary if the crop is to be clean and marketable. One report states that three sprayings gave 80 per cent. clean fruit, one spraying gave 50 per cent., while unsprayed trees gave from 10 per cent. to 50 per cent. clean fruit. Another report from the east, states that from this year's experience, spraying must be done to succeed. There was a marked difference between sprayed and unsprayed orchards this season, especially in regard to wormy apples.

Results with the plum rot and San Jose scale were not so favorable, reports varying widely. Better results were reported from the use of Bordeaux in its various forms upon cherries for the control of the rot, some stating that the disease was entirely checked. For the scale, lime-sulphur

mixture and Carlson's mixture are reported as the best remedies, but neither of these were entirely satisfactory.

In the west, reports state that where the spraying is properly done, good results follow, while where a poor machine and coarse nozzles are used, the results are not satisfactory. At the College in Guelph, where the spraying was thoroughly done, an excellent crop of fruit of good quality was the result.

9. *What were the average prices offered for apples and were many buyers present?*

Prices ranged from $1.00 to $1.50 per barrel in the orchard for XX and XXX, and from $2.00 to $3.00 for the same grades packed ready for shipment. Local buyers took the crop in most instances.

10. *Notes on scarcity of labor, effects of cultivation, special conditions of climate, etc.*

Labor is reported scarce, even unskilled labor being hard to get at any price. Some fruit was lost owing to this scarcity, and much of it was badly packed. Cultivation of the orchards was neglected in many instances, owing to the wet weather and this scarcity of labor. Where orchards were cultivated, the fruit was not as highly colored as orchards in sod owing to the excess of moisture. Along Lake Erie, rain was lacking almost entirely from July 12th to August 10th, while elsewhere in the Province, especially early in the season, the rainfall was excessive.

APPENDIX "E."

REVISED CONSTITUTION AND BY-LAWS OF THE FRUIT GROWERS' ASSOCIATION OF ONTARIO.

Preamble.

The objects of the Fruit Growers' Association of Ontario shall be the advancement of the science and art of horticulture in all its branches.

(*a*) By holding an Annual Convention for the consideration of questions relating thereto.

(*b*) By co-operating in every possible way with district and local fruit growers' associations and horticultural societies hereinafter mentioned.

(*c*) By collecting, arranging and disseminating useful information.

(*d*) By co-operating with the Ontario Department of Agriculture in all matters pertaining to the advancement of horticulture.

(*e*) By holding an annual exhibition of fruit and other horticultural products and awarding premiums in connection with the same.

(*f*) And by such other means as may from time to time seem desirable.

Name.

1. This Association shall be called the Fruit Growers' Association of Ontario.

Membership.

2. Any person interested in horticulture may become a member by payment of one dollar per annum in advance, either to the general secretary or the secretary of any district or local association or society in affiliation with the provincial association. A single payment of $10.00 to the general secretary shall constitute a member for life.

3. Members of this Association in good standing shall be entitled to receive regularly the official organ of the Association, a copy of the Annual Report, such other literature as may be sent out by the Association from time to time and any other privileges that may be provided or arranged for by the Association.

4. The Association year shall end on the 31st of October.

Annual Meeting.

5. The Annual Meeting shall be held at such time and place as may be designated by the Association.

Officers.

6. A President, Vice President, Secretary-Treasurer and Directors only shall be the duly qualified officers of the Association.

7. The Directors shall be elected at the morning session of the last day of the Annual Meeting, and shall be thirteen in number, representing the thirteen agricultural divisions as set forth in Schedule "A" of the Ontario Agriculture and Arts Act. In addition to the Directors herein provided for, the Association may at the Annual Meeting, elect such other directors from time to time as may be deemed expedient and in the interests of the Association.

8. The newly elected Directors shall at their first meeting appoint from among their number a President and a Vice-President, and also from among themselves or otherwise, a Secretary-Treasurer.

9. The President, Vice-President, Secretary-Treasurer and two other members appointed by the Directors shall constitute the Executive Committee of the Association.

Duties of Officers.

10. It shall be the duty of the President to preside at all meetings of the Association, decide all questions of order, and make any suggestions he may deem necessary in the interests of the Association. He shall be *ex-officio*, a member of all committees appointed.

11. In the absence of the President, the powers and duties of his office shall devolve upon the Vice-President.

12. It shall be the duty of the Secretary-Treasurer to attend all meetings of the Association, the officers and the Executive, and keep correct minutes of the same; conduct all correspondence and issue all press and other reports; prepare the report of the Executive Committee for the Annual Meeting; forward the list of representatives to the Secretaries of Fair Associations, also prepare for publication the Annual Report. As Treasurer, he shall receive and account for all moneys belonging to the Association, pay such bills and accounts as have been approved by the Executive. He shall have the power of Managing Director acting under the control and with the approval of the Executive.

13. By virtue of his office he shall be a member of each committee appointed.

14. Before entering upon the duties of his office, he shall enter into a bond, with security when required, which shall be approved of by the Directors.

15. The accounts of this Association shall be audited by an expert auditor or accountant appointed by the Executive Committee, and approved by the Minister of Agriculture for Ontario.

16. At each Annual Meeting, the retiring executive officers shall present a full report of their proceedings to the Association. A detailed statement of the receipts and expenditures for the previous year, and of assets and liabilities, a list of members and such information on matters of special interest to this Association as the officers may have been able to obtain, shall be sent to the Minister of Agriculture for Ontario within forty days after the holding of such Annual Meeting.

17. The Executive Committee shall carry into effect the plan of work decided upon by the officers, and shall arrange the details of the same.

18. The officers, or the members of the Executive, or of any Committee may conduct by correspondence, the duties assigned to said officers, Executive or Committee, by the Constitution and By-laws, or by the Association, when such a course is deemed advisable by said officers, Executive or Committee.

19. In case a vacancy occurs in the officers or directorate ,the Executive Committee may fill said vacancy forthwith.

Committees.

20. The Association may appoint such committees from time to time as may be deemed expedient, and the first person named thereon shall be declared chairman of each committee.

21. The actual and reasonable expenses of officers and members of committees when attending meetings in the interests of the Association shall be defrayed out of the funds of the Association.

Notice of Meeting.

22. (*a*) At least two weeks' notice shall be given of each annual and general meeting, naming time and place of meeting. Notice may be given through the public press and by circular letter mailed to each member.

(*b*) An officers' meeting shall be called by mailing at least ten days before date of meeting to each officer, a notice of meeting as above provided.

(*c*) Similar notice shall be given to each member of the Executive before an Executive meeting is held.

(*d*) An Executive meeting may be held on shorter notice, provided each officer is otherwise notified and consents thereto.

Quorum.

23. (*a*) Not less than ten members shall be a quorum to transact business for the Association; not less than five members shall be a quorum at an officers' meeting; and not less than three members shall be a quorum of an Executive meeting.

(*b*) Any member of the Directorate or Executive not present at a meeting, if he send his views in writing, shall be considered as present.

Affiliated Societies.

24. Local Fruit Growers' Associations and Horticultural Societies in affiliation with this Association may be organized in any locality where it is deemed advisable, and it shall be the duty of the officers and directors of this Association to encourage the formation of such local societies.

25. The membership fee in the aforesaid affiliated societies shall be the sum of one dollar per annum payable in advance. Of this amount the local secretary shall transmit to the Secretary-Treasurer of this Association, the sum of seventy-five cents for each member, the payment of which shall entitle the members of the local society to all the privileges and advantages of membership in this Association.

26. The proceedings of such affiliated societies, shall on or before the first day of November each year be forwarded to the Secretary of this Association, who may use such portions for the Annual Report to the Minister of Agriculture as may seem to him of general interest and value.

27. Each affiliated Society is further expected to send one duly accredited delegate to the Annual Meeting of this Association for each fifty or more members, and the expenses of said delegates shall be paid by this Association.

28. The Directors of this Association for the Agricultural District in which any society if formed shall be *ex-officio*, a member of the Directorate of such affiliated societies and receive notice of all its meetings.

Change of Constitution.

29. This constitution and by-laws may be amended by a majority of members present at an Annual Meeting or a special meeting called for the purpose of considering the same, and of which two weeks' notice shall be given.

APPENDIX "F."

THE LATE DELOS W. BEADLE, B.A., LL.B.

17 October, 1823—30 August, 1905.

During the year 1905 there passed quietly away in the city of Toronto one of two then living constitutional members of the Ontario Fruit Growers Association, in the person of Mr. Delos W. Beadle. To this gentle-

man in no small degree, is due the early progress and development of the fruit growing interests of this Province and some lasting tribute to his memory is justly due from this society.

Mr. Delos W. Beadle inherited a taste for horticulture from his father, Dr. Beadle of St. Catharines, who was one of our earliest Canadian nurserymen. He was born in that place on October 17, 1823, and was prepared for college at the Grantham Academy, now the St. Catharines Collegiate Institute. In September, 1841, he entered the sophomore class in Yale College, New Haven, Conn., where he obtained his B.A. degree in July, 1844, and two years later he received his B.A. (*ad eundum*) from the University of Toronto. In 1874 he received his LL.B. degree from Harvard University, Cambridge, Mass., and in 1848 he was called to the bar in New York City, where he practiced law for about 6 years. His failing health made it necessary for him to seek an outdoor life. He accepted from his father an interest in the nursery business, in which line he continued until his retirement in 1887.

When the Hon. George Brown began the publication of the Canadian Farmer, Mr. Beadle undertook the charge of the horticultural department and continued to edit it for several years.

In January, 1859, the Fruit Growers' Association of Upper Canada was organized in the City of Hamilton, with 18 members. Judge Campbell was the first president, and Arthur Harding, the first recording secretary. On the 16th of January, 1861, Judge Logie of Hamilton, was elected president and D. W. Beadle, secretary, a position which he filled for twenty years with such distinguished ability, that his statements on matters horticultural were everywhere in Canada looked upon as authoritative and reliable. Dr. William Saunders in his annual address, as president in 1884, says of him: "While I acknowledge with pleasure the valuable aid rendered by my much esteemed predecessors in the presidential chair, the lamented Logie, W. H. Mills, Dr. Burnet and P. C. Dempsey and esteem it an honor to wear their mantle, I feel free to say with no fear of contradiction, that the Fruit Growers' Association owes its present high position and influence more to its able secretary than to any other man belonging either to the past or to the present."

At the suggestion of Mr. Beadle, the publication of the Canadian Horticulturist was undertaken in January, 1878, by our Association. His idea was that such a publication would serve to hold together the membership by affording a means of constant intercommunication of ideas, suggestions and experiences in horticulture throughout the round year. As an evidence that Mr. Beadle's abilities were recognized abroad, we may add that on the 10th of November, 1862, he was elected corresponding member of the Horticultural Society of London, England.

In the year 1887, Mr. Beadle sold out his nursery business in St. Catharines to the D. W. Beadle Nursery Company. At the same time he resigned as secretary of the Ontario Fruit Growers' Association and editor of the "Canadian Horticulturist." His most valuable book, "The Canadian Fruit, Flower and Kitchen Gardener," was dedicated to the President and members of the Ontario Fruit Growers' Association. The rest of his life he spent in Toronto, a student of nature and botanical research until his lamented death, the 30th of August, 1905.

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Twelfth 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

1905

PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

Printed by L. K. Cameron, Printer to the King's Most Excellent Majesty
Toronto, 1906

WARWICK BRO'S & RUTTER, Limited, Printers
TORONTO

To the Honorable WILLIAM MORTIMER CLARK, K. C.,
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOR:

I have the pleasure to present herewith for the consideration of your Honor the Report of the Fruit Experiment Stations for 1905.

Respectfully yours,

NELSON MONTEITH,
Minister of Agriculture.

TORONTO, 1906.

TWELFTH ANNUAL REPORT

OF THE

Ontario Fruit Experiment Stations.

To the Honorable the Minister of Agriculture:

SIR,—I have the honor to present for your consideration the Twelfth Annual Report of the Ontario Fruit Experiment Stations, containing valuable reports from our fruit statio s and some important plans for further progress. The revised and complete edition of "Fruits of Ontario" will be issued later as a separate report.

I have the honor to be, sir,

Your obedient servant,

LINUS WOOLVERTON,
Secretary of the Board of Control.

December, 1905.

Fruit Experiment Stations.

BOARD OF CONTROL, 1906.

G. C. Creelman, B.S.A., Professor of Agricultural College, Guelph .... Chairman.
H. L. Hutt, B.S.A., Professor of Horticulture ..... Guelph.
W. T. Macoun, Horticulturist at Central Experimental Farm ..... Ottawa.
Elmer Lick, Director of Ontario Fruit Growers' Association ..... Oshawa.
A. M. Smith, Director of Ontario Fruit Growers' Association ..... St. Catharines.
P. W. Hodgetts, Secretary of the Ontario Fruit Growers' Association ..... Toronto.
Linus Woolverton, M.A., Grimsby ..... Secretary.

EXECUTIVE COMMITTEE.

G. C. Creelman ..... Chairman.
Prof. Hutt ..... } Inspectors.
L. Woolverton ..... }
P. W. Hodgetts ..... Sec. O. F. G. A.

THE ONTARIO FRUIT STATIONS.

Name.	*Fruit.*	*Experimenter.*
1. Southwestern	Peaches	W. W. Hilborn, Leamington.
2. Wentworth	Grapes	Murray Pettit, Winona.
3. Burlington	Blackberries and Currants	A. W. Peart, Burlington.
4. Lake Huron	Raspberries	A. E. Sherrington, Walkerton.
5. Georgian Bay	Plums	J. G. Mitchell, Clarksburg.
6. Simcoe	Hardy Apples & Hardy Cherries	G. C. Caston, Craighurst.
7. Bay of Quinte	Apples	W. H. Dempsey, Trenton.
8. St. Lawrence	Hardy Plums and Hardy Pears	Harold Jones, Maitland.
9. Strawberry Station		E. B. Stevenson, Ponsonby.
10. Maplehurst	Cherries. Peaches, Pears, Plums, and other tender fruits; also a general collection of all kinds of fruits for descriptive work for "Fruits of Ontario."	L. Woolverton, Grimsby, Ont.
11. Algoma	Hardy Fruits	C. Young, Richard's Landing.

Fruit Experiment Stations, 1905.

THE SECRETARY'S REPORT.

By Linus Woolverton, Grimsby, Ont.

During the year 1905 the work planned by the Board of Control has been carried out by your Secretary and by the various experimenters as fully as possible.

The following list of fruits for testing at all stations was sent each experimenter, asking that he mark out any that would duplicate varieties already planted, and the lists as revised were duly ordered for each station. Some of the varieties, however, could not be secured, and must be included in the new lists for 1906.

Fruits for Testing at all Stations.

Apples. Gravenstein, Ontario, Cranberry, Louise, Wolf, Alexander, Bogdanoff, Duchess, Transparent, Milwaukee, Charlamoff, Longfield, Boiken, Patten's Greening, Russell, LaVictoire, Windsor Chief, Mammouth Black Twig, Huntsman, York Imperial, Brockville Beauty.

Peaches. St. John, Fitzgerald, Lewis, Champion, Elberta, Longhurst, Carlisle, Smock, Carmen, Emperor, Niagara, New Prolific, Banner, Beers Smock, Klondike, Leamington, Millionaire.

Cherries. Orel, Richmond, Montmorency, Brusseler Braune, Late Duke, Lutovka, Suda Hardy, Koslov, English Morello, Byng, Windsor, Dyehouse, Elkhorn, Mezel, Homer, Compass.

Apricots. Shense.

Pears. Pitmaston, Hoosic, Wilder, Chambers, Louise, Triomphe de Vienne.

Plums. Red June, Chabot, Late Orange, Whittaker, Maynard, Richard Trotter, Dunlop, Stoddart, Emerald, Don.

Grapes. Campbell, Charlton, McPike.

Currants. Wilder, Ruby, London, Cherry, Prince of Wales, Champion, White Versaillaise.

Blackberries. Ancient Briton, Eldorado, Agawam, Child's Tree, Lincoln, Ozark, Lawton, Snyder, Eureka, Rathbun, Early Cluster.

Raspberries. Herbert, Cumberland.

Gooseberries. Columbus, Champion, Golden Prolific, Oregon, Jumbo.

The following varieties of apple trees were sent out by W. T. Macoun, Horticulturist Central Experimental Farm, Ottawa, to our experimenters in New Ontario, in the Temiskaming District, viz.: Transparent, Milwaukee, Duchess, Charlamoff, North West Greening, Wealthy, Patten's Greening, Hibernal, McMahon White, Scott's Winter; also the following hardy kinds of plums, viz., Bixby, Mankato and Don.

At the Southwestern Station in Essex, where the peach orchards have been twice killed out by winter freezing of the roots, five acres were planted to peach trees for the especial object of testing various methods of winter protection, for the encouragement of this important industry.

Our experimenter on St. Joseph's Island, having reported much damage to fruit trees from sun scald, I sent him, under the instructions of the

Board, four dozen veneer tree protectors for shading the trunks, to ascertain if this would prevent such injury.

The instructions of the Board regarding a supply of bottles for the experimenters were also fully carried out. The object of these was to enable them to keep for exhibition such early fruits as would otherwise be out of season.

Visits to Stations.

During the fruit season your Secretary made such visits to the Fruit Stations as were necessary in the work of studying fruits as they were growing and ripening under various conditions, and for the securing of normal samples of fruits for illustrations.

The Strawberry Station. The first fruit of the season to ripen is the strawberry, and, where soil conditions are favorable and proper methods of cultivation employed, it is, perhaps, the most profitable. The wonderful improvements in varieties of late years have contributed much to give the strawberry its high place among the profitable fruits, and any one who fails to secure the new and productive varieties mentioned in our reports will make a serious mistake. The extension of the season, by breeding early, mid-season and late varieties, is another important factor in successful strawberry culture, which should be carefully considered by planters.

Since our strawberry experimenter, the Rev. E. B. Stevenson, resides at Ponsonby, which is a few miles from Guelph, and since Prof. Hutt has on the College grounds every desirable variety under trial, I thought best to go up on the 27th of June and look over the collections.

The results of the tests by Prof. Hutt, and of those by Mr. Stevenson, do not always harmonize, neither do the reports of one year on the same grounds always harmonize with those of another concerning the same varieties. I am of the opinion that this is in part due to the limited extent of the experiment. One hundred and fifty varieties, giving 12 feet to 20 feet of row to each does not afford sufficient test of commercial varieties. I would recommend the same course of procedure which I advised the Board of Control last year, viz., that ten or a dozen of the most productive varieties be selected, and of these say fifty or one hundred plants be sent each experimenter, insisting upon exact reports from each upon vigor and productiveness. We would thus be very soon in a position to recommend certain varieties with absolute confidence; and, further, we might be able to say which varieties were best suited to the different districts, and to the different soil conditions.

The Cherry Station. The second fruit to ripen is the cherry, and all known kinds of this fruit are being tested on my own grounds. Unfortunately, as you will see from my Cherry Report, the season has been a most disastrous one for this fruit. Many orchards of Sweet cherries bore little or no fruit, while, owing to the continuous wet in picking season, what fruit was produced rotted before ripening. Certain varieties, however, seemed to be almost rot-proof, as, for example, the Orel, Russian 207, Dyehouse, Purity, Richmond, and Montmorency. I would advise sending a dozen or more trees of each of these varieties to each station.

The Raspberry Station. Closely succeeding the cherry is the raspberry, a fruit which is becoming every year more popular with housekeepers. Indeed, there is no fruit which has such an exquisite flavor either in jam, preserves, or canned, as the raspberry, and the demand is bound to increase rapidly. We are testing all varieties of the raspberry at Walkerton on the grounds of Mr. A. E. Sherrington, who is keeping careful

records of the behaviour and comparative merits of each. I visited his experimental grounds on the 2nd of August, and found him in the midst of his raspberry harvest. Prominent among his varieties of red raspberries stood the Herbert, for its vigor of bush and its productiveness. It appears as though in the near future it will be Herbert and Cuthbert for favorite market berries instead of Marlboro and Cuthbert, as at present. When we plant a lot of varieties side by side it is surprising how many of the new varieties, which have been introduced as superior to any in existence, are at once shown to be inferior. Mr. Sherrington will ask the Board to allow him to weed out a great number of the varieties now in his plantation, and to plant more freely of certain promising kinds. Of black, for example, he finds Miller and Older too small to be profitable; of white, Caroline and Golden Queen are useless; and of the purple, neither Shaffer nor Columbia are to be recommended for his district.

The Herbert should be planted freely at all our stations so that we may know its real value for the practical fruit grower as quickly as possible, because, if it bears out present promises, the sooner the fact is known the better.

Gooseberries are doing remarkably well with Mr. Sherrington, and for fruit growers in his district they appear to be well worthy of consideration for planting as a market fruit. The Red Jacket, for example, bears most abundantly at Walkerton, and sells at a remunerative price. I would advise the Board to send Mr. Sherrington a liberal number of plants of Red Jacket, Keepsake, Whitesmith, and Pearl, for careful tests as to yield and selling price.

There being no peaches at the Peach Station in Essex, and very few plums at the Plum Station in Grey, I did not visit these stations this season; nor the apple stations east and north, having visited them so recently.

The Hamilton Fruit and Flower Show.

In accordance with instructions from the Minister of Agriculture, the Honorable Nelson Monteith, I made an educative exhibit of fruit at this show, which was held in the Thistle Rink on the 12th, 13th and 14th of September, 1905. There are two large rinks, one of which was devoted to flowers and the other to fruits.

In making the Experiment Station exhibit those stations only were invited to contribute which are in the Hamilton District, viz., Burlington, Wentworth and Lincoln, the latter being represented by the Secretary's collection.

These exhibits were of great interest to the visitors, covering five large tables, or about three hundred square feet of space, on the left of the entrance of the fruit rink. They were distinctly labelled "Ontario Fruit Stations," and your Secretary was in attendance, not only during the whole three days of the Fair, but, also, the day previous, setting up the exhibit, and the day after for its removal.

The Burlington Station showed a fine collection of apples and pears, including several baskets, packed with choice fruit, ready for market. The principal feature of this exhibit, however, was the excellent show of all varieties of red, black, and white currants, put up in bottles with formalin. Branches had been cut and placed in the bottles, to show the manner of fruiting. The liquid was perfectly clear, and showed the fruit in a perfect appearance.

The Wentworth Station showed a very large collection of varieties of grapes, divided into two lots, the one containing the most desirable kinds,

the others those new, or undesirable, or of which the merits are, as yet, not fully decided upon. It is worth noting, however, that some kinds which have been condemned other seasons, have this year showed considerable merit. It is, therefore, evident that tests must extend over several seasons to be at all accurate.

From the Secretary's fruit farm, on which a large collection of varieties has been planted for study and description, a great variety of apples, pears, peaches, plums, and grapes were shown, covering about one-half the whole space. Among these was a collection of Japan plums, which attracted the attention of fruit growers. The kinds shown were Burbank, Wickson, Satsuma, Hale, Golden Prolific, and Chabot. Among the pears some fine export varieties were shown, including Anjou, Clairgeau, Hardy, Duchess, Bosc, Louise, Pitmaston and Triomphe de Vienne. For home markets there were shown such varieties as Giffard (in bottles), Bartlett, Clapp's Favorite, Hoosic, Sheldon, Seckel, Souvenir de Congres, Elizabeth, Petite Marguerite, etc. Some of the newer varieties of grapes shown were Ohio, Black Giant, Woodruff, Early Victor, Diamond, Green Mountain, Empire State, etc.

On the whole this kind of an exhibit, with a Superintendent to give information about the varieties suited for home uses, for export, for home markets, and about novelties tested at the stations, promises to be of great service to practical fruit growers. Another important service which can be rendered fruit growers is the identification of varieties. Judges often give prizes to kinds wrongly named, not knowing the variety sufficiently well to detect the attempted imposition by an exhibit, or to correct his error. Sometimes a variety is misnamed by all growers of a section through the error of a nursery man; for example, near Collingwood, the writer once found the Clairgeau grown by several people, and exhibited as Louise. An expert in charge of our experimental exhibit can often correct these errors, and it would be well if the authorities of Fairs would accept such a person as referee.

The Toronto Fruit Show.

In response to my request as authorised by the Board of Control, the fruit stations made a very fine exhibit in Massey Hall. The place assigned was unfavorable, being at the centre of the front, under the gallery, where the light was dim. The table also was too wide to show the fruit placed on the far side, which was only approachable from the front.

The Experiment Sation exhibits covered about 400 feet square of table space, and were of great interest to fruit growers. The principal varieties, which were recommended for each district for commercial purposes, were shown in pyramids, and those still under test in plates of five. Thus, Mr. Jones, of the St Lawrence district, showed a large pyramid each of Fameuse, McIntosh, and Scarlet Pippin; Mr. Dempsey, of King, Ben Davis, Fallawater, Ontario, Stark, Baldwin, Spy, Fameuse and McIntosh; Mr. Peart, of Baldwin, Greening, Spy, etc.

Mr. Sherrington showed quite a variety of fruits, especially in bottled currants, cherries, and raspberries. The complete list of fruits, shown by him, will given some idea of the extent of the exhibits of varieties shown by each of our experimenters, so we subjoin his list in full.

Apples. Golden Russet, Ben Davis, Barry, Cranberry Pippin, Fameuse, Grimes Gilden, Greening, Hurlbut, King, McIntosh, North Western Greening, Ontario, Pewaukee, Pound Sweet, Ribston, Salome, Spy, Seek, Seedling, Tolman, Transparent, Wealthy, Wagener, Winter Banana.

Pears. Kieffer.

Cherries. Dyehouse, Downer's Late, Empress Eugenie, English Morello, Early Richmond, Late Duke, Montmorency, Ostheim, Olivette, Reine Hortense, Wragg, Yellow Spanish.

Strawberries. Brandywine, Saunders, Strawberry-Raspberry.

Currants. Black Victoria, Champion, Cherry, Fay, North Star, Naples, Pomona, Prince Albert, Red Cross, Raby Castle, Saunders, Versailles, White Grape, White Imperial.

Gooseberries. Downing, Pearl, Red Jacket.

Raspberries. Brandywine, Brinckle, Cuthbert, Caroline, Golden Queen, Herbert, Harris, Loudon, Marlboro, Miller, Phoenix, Reliance, Turner, Thompson.

Black Caps. Conrath, Gregg, Hilborn, Kansas, Ohio, Older, Smith's Giant.

Blackberries. Agawam, Eldorado, Snyder.

Mr. Caston's exhibit was in one way the most striking one of all, having two immense pyramids of Wolf River apples, many of which were 16 inches in circumference. Such Wolf River apples have not been shown before in Ontario. His Baxter apples were also remarkable for their size and beauty; and a pyramid of Peerless was most excellent, quite bearing out all that Mr. Caston has said in its favor.

I began a kind of exhibit at this show which I think can be made of still greater interest in future. I showed in one collection about twenty varieties of commercial apples, one good average sample of each variety, and each labelled in bold letters, with a shading pen. In another, twelve varieties of dessert apples, one sample of each; in another twelve varieties of pears recommended for export, etc. I found that many people stopped to study these collections and to take note of the same for future guidance.

Another educational feature which I prepared, at the suggestion of Mr. Cowan, was a card for each commercial variety with a few brief notes regarding it, which could easily be read by the visitor. We give a few examples:

GRAVENSTEIN: An apple of the very highest quality for cooking, excellent for export, succeeds in the Southern districts, and worthy of being planted widely for export.

BLENHEIM: A high grade apple to fill in between the Gravenstein and the King. Adapted to apple districts south of Kingston, Peterboro and Orillia.

BELLFLOWER: A good apple when well grown, but inclined to be irregular in form and size. Adapted to the great apple districts along the shores of lakes Erie and Ontario.

MCINTOSH: A very excellent dessert apple; badly subject to scab in the southern apple districts, but successfully grown in the St. Lawrence and other northern districts.

The display of bottled currants and other fruits by Mr. Peart, and of raspberries etc., by Mr. Sherrington, were usually fine, and deserve especial mention. These unfortunately had to be set up too far back for proper exhibition; for they need to be near to the eye, and upon a line with it. In future exhibitions we hope for better instalment.

I was in attendance every day of the week to answer questions except Friday, the day of our Pomological Meeting; and the various experimenters, Mr. Sherrington, in particular, gave me much assistance in this work, as

did also Mr. A. M. Smith, of our Board. This attendance upon the exhibit I would emphasize before the Board as of extreme importance, if we desire to make our work of the greatest educational value.

The Board of Control.

No change has been made in the personnel of the Board of Control. The following members having been reappointed for the year 1906, by the Ontario Fruit Growers' Association, viz.:—A. M. Smith, Port Dalhousie; Elmer Lick, Oshawa; and W. T. Macoun, Horticulturist of the Central Experimental Farm, Ottawa.

A meeting of the Board was held at the Parliament Buildings, Toronto, on the 8th of December, 1905. The first business was an interview with the Hon. N. Monteith, Minister of Agriculture, regarding the work of the Fruit Stations, after which the Board met in one of the committee rooms to hear the reports, and correspondence read by the Secretary.

All the reports from the experimenters having been received, the Secretary was authorized to ask the department for payment of their respective salaries for 1905.

The report of inspection of the various stations by Prof. Hutt was read by him, and is printed in full in this volume.

The Secretary laid before the Board his work on the fruits of the Province, having included during the year the varieties agreed upon for the first edition of a complete volume, showing all the varieties studied and described during the last seven years, in alphabetical order.

The Secretary was authorized to place or record the appreciation by this board of Mr. W. T. Macoun's action in sending to our experimenters in New Ontario such varieties of hardy apples as seemed to him worthy of test in that district.

Plans for 1906.

The following are some of the more prominent lines of work ordered for the new year.

The continuance of the exhibit at the Canadian National of the best fruits then in season, including bottled samples of small fruits; standard packages of fruit; charts showing fruits adapted to the various districts; devices for trapping codling moths and for protecting trees from mice and rabbits; spraying mixtures, etc.

The ordering of desirable varieties of the newer fruits for testing at the various stations, and recommended varieties for general test;

The appointment of a committee, consisting of Messrs. G. C. Creelman, P. W. Hodgetts and Prof. H. L. Hutt, to consider the desirability of locating another station somewhere between Walkerton and Leamington;

The continuance of an exhibit of summer fruits at the Hamilton Fruit and Flower Show, in case this is continued in 1906;

Arranging for special educative exhibits of fruit at the Toronto Fruit, Flower, and Honey Show in conjunction with those from the Agricultural College and those from the Central Experimental Farm at Ottawa;

Ordering the revision of the various sections of the Secretary's work on the "Fruits of Ontario," by various fruit experts as follows, viz.:

Apples, by W. T. Macoun, Horticulturist, C.E.F., Ottawa; Pears, by M. Pettit, Winona; Peaches and Cherries, by A. M. Smith, Port Dalhousie; Plums, by W. M. Orr, Fruitland; Grapes, by W. H. Bunting, St. Catharines; Small Fruits, by Prof. H. L. Hutt, O.A.C., Guelph; these gentlemen to act as chairmen of committees to be at their own appointment.

A New Experiment Station.

In view of the changing conditions affecting the work of the Ontario Fruit Stations, the Board of Control passed a resolution expressing their views to the effect that the time has now come for a further enlargement of our work, and for taking up other lines of experimental work, such for example as the production of new and more valuable varieties of fruits; the Board therein recommended to the favorable consideration of the Hon. Minister of Agriculture, the establishment of an Experimental Farm in the Niagara district, in charge of a suitable person, who would devote his whole time to the work.

The Financial Statement for the year 1905 was presented by the Secretary, who pointed out that he had kept within the estimates in the expenditures.

The Financial Statement for 1905.

Salaries of Experimenters	$1,850 00
Salaries of Secretary and Inspectors	1,100 00
Fruit Exhibits and Pomological Meeting	398 27
Travelling expenses of Inspectors	112 50
Photographs of fruits	95 30
Trees and Plants for Stations	236 48
Tree protectors	3 70
Freight, express and duty	16 47
Books, Printing, and Stationery	46 75
Postage and telegrams	16 42
Board Meetings	33 27
Reporting	12 00
Albert Hall for Pomological Meeting	4 50
	$3,925 66

REPORT OF THE INSPECTOR OF THE FRUIT EXPERIMENT STATIONS.

By Prof. H. L. Hutt, O.A.C., Guelph.

I inspected each of the stations this year, and noted the condition and progress of the work. On the whole it has been much along the same line as last year and satisfactory progress has been made. It is hardly necessary, therefore, for me to report upon it in detail again, as was done last year. There are, however, a few general features of the work to which I wish to call your attention, and some changes which I think it advisable to make.

The Fruit Experiment Stations were established eleven years ago, primarily for the purpose of determining what varieties of the various kinds of fruits were best adapted to the different sections of the Province. At that time the fruit industry had not anything like the commercial importance it has to-day. Planters were more or less at a loss to know what was best to plant. Many of the older varieties were proving unsatisfactory, and the hosts of new ones being introduced from year to year only added to the general confusion of the planter. During the eleven years that the stations have been established, our experimenters have been testing and comparing the new with the old, with the result that the greater number of the much-lauded new varieties have been found worthless, some have been recommended for further trial, and a few have proved worthy of more general planting. In most cases the experimenters are now in a position to speak with authority in recommending the varieties most desirable for planting in their particular sections.

In so doing the Experiment Stations have brought order out of confusion, and because they have done so it might appear that they had accomplished their purpose, and the work might now be dropped. The result of such a course would not be hard to foresee; in a very few years we would be as far behind the times as we were when the work began. Our aim must be progress, and our policy should be to adapt the work of the stations to meet the requirements of the times. Inasmuch as variety testing is concerned, this must necessarily be continued as a prominent feature of the work. Our report should now give annually a list of the varieties recommended for general planting from each of the stations, indicating those most desirable for commercial planting, and those specially adapted for home use. Lists should also be given of those varieties which have been fully tested and are not recommended, stating why they should be discarded. Lists might also be given of those varieties which are deemed worthy of further trial before placing them on either of the foregoing lists.

At each of the stations there should be a general weeding out, as soon as possible, of those varieties which have been fully tested and have not come up to the requirements, and in their stead those varieties which have proved most valuable should be grown in larger numbers, at least sufficient to afford a good standard for comparison, and the new varieties appearing from time to time should be added and tested as soon as they can be obtained, so that we may still keep abreast of the times with regard to all varieties deemed worthy of cultivation.

One of the important facts brought out by the Fruit Experiment Station work is that the lists of varieties desirable for planting must vary considerably to meet the requirements of the different sections of the country. No one list will do for all parts of the country. In this particular the co-operative nature of the work has proved its adaptability to the needs of the country better than any one central experiment station could do. And this leads us to ask if we yet have enough stations to fully represent the varied conditions of all sections of the Province. Two years ago I recommended the extension of the work to include the Temiskaming district, for the benefit of the settlers going into that newer part of Ontario. Collections of the hardiest varieties of the fruits most likely to succeed in that northern latitude have been sent to four of the pioneers of that section, and a co-operative effort is thus being made to ascertain the fruit-growing possibilities of that northern part of the Province.

In the Niagara district a strong effort has been made during the past year to impress upon the Government the necessity for establishing a large Central Fruit Experiment Station for that district—one owned by the Government and managed entirely for the good of the public, where more of the problems confronting the fruit-grower might be worked out than can be attempted under the plan of privately owned stations. This matter may be outside the jurisdiction of our Board, yet an expression of opinion on the subject of this Board would not be without weight. The growing importance of the fruit interests and the multiplicity of the unsolved problems connected with it, well warrant the careful consideration of the Government and the united efforts of the growers. Unfortunately for the majority of fruit-growers, the Dominion Central Experimental Farm and the Provincial Experimental Farm are both too far away from the tender fruit belt to render as much assistance as they otherwise might. So that a third Experimental Farm, or even a Branch Fruit Experiment Farm, in the tender fruit district, might be made of great service to fruit-growers of that section.

There is another important fruit district which is not reprsented by any of the stations, and has not yet asked for a station, that is the Central Western part of the Province. Taking the County of Middlesex as a centre, we have Huron and Perth on the north, Lambton and Kent on the west, Elgin on the south, and Oxford on the east. All of these counties are more or less extensively engaged in the fruit industry, and are not represented by any of the stations. A good station, centrally located, should be of great value to that part of the Province. It would help to bring its fruit-growing into prominence, and would, no doubt, as the work has done in other places, bring out some of the prominent growers of the district and secure their co-operation in advancing the fruit interests of the Province generally. In this particular alone the Experiment Stations already established have done something which has been well worth all that has been expended upon them—they have brought into public service some of the most energetic and progressive men engaged in the fruit industry of to-day.

POMOLOGICAL MEETING.

The Secretary also reported having arranged for a pomological meeting of expert fruit growers near Massey Hall, on Friday the 17th of November, during the week of the Fruit Fair. This meeting was well attended, and served to bring out many important details concerning the behavior of varieties in the various districts. The following is a report of the addresses and discussions at this meeting.

CO-OPERATION IN PLANTING.

By Linus Woolverton, Grimsby.

Co-operation is without doubt the keynote of successful fruit growing in this twentieth century. Slowly, very slowly, our fruit growers are awakening to the importance of united effort. It was not until the unbusiness-like methods of sale forced down the prices of fruit so low that little or no profit remained to the owner of an orchard to meet the value of time and labor, and interest on investment, that he was willing to enter into co-operative work.

The first move has been co-operation in sales. Local organizations have been formed, the members of which place their fruit under the control of the Association so that contracts are made for the sale of it to distant buyers in car lots.

Next comes co-operation in packing, which means that all fruit handled by the Association is graded to uniform size and quality, either individually subject to the inspection of an overseer, or at a central packing house; each man to receive pay according to grades of his fruit.

Then we have co-operation in spraying, which included a power sprayer and an expert to run it and to do the work thoroughly, which is the only kind of spraying that counts. Perhaps Mr. Tweddle's ideas may prevail. Mr. Tweddle is a progressive fruit grower of Fruitland, near Hamilton, who has made a specialty of pruning and spraying apple orchards. He says it should be one of the conditions of membership of a local fruit growers' Association, that each member have his trees cultivated, pruned and sprayed according to certain rules, so that the fruit sent out should be of the very highest grade of excellence.

All these are important points of progress, but there is still one that receives too little, if any consideration, and that is co-operation in planting. The curse of many orchards in Ontario is the great collection of useless varieties often found in them. Some ten years ago when I was asked by the Dominion Department of Agriculture to make up experimental shipments of pears and peaches to Great Britain, I found it almost impossible to collect enough cases of any one good variety of each to make a fair showing upon any large market. Mixed lots are slow of sale and often bring low prices. This difficulty can be remedied by co-operation in planting. The local Association should decide upon the most desirable varieties of apples, pears, peaches, grapes and cherries for the section represented, and see that a sufficient average is planted to each variety by members of the Association to make up car lots of the same for shipments, either to our Great North-West or to Europe.

It is to aid in deciding upon the most desirable kinds to plant in quantity for profit in each locality, that the work of the Ontario Fruit Stations has been conducted during the past ten years, and I think we have in that period made much progress in the way of proving what kinds should be planted and what should not in the various sections.

Take pears for example. We have an excellent market for the Bartlett in the Winnipeg market, a market that will take larger quantities every succeeding year. But in what section of Ontario can this pear be put up in car lots, outside of the Grimsby and the Burlington district?

For export to Great Britain again we have several kinds that give excellent returns, and which grow to perfection in many parts of the Province, for example we may name Howell, Bosc, Pitmaston, Duchess, Louise, Clairgeau, Anjou, Diel, Easter Beurre and others. Put up in half bushel cases and carefully packed and shipped in lots of a few hundred cases of a variety there is almost an unlimited market abroad, with most encouraging returns; but where in this Province can you find a sufficient number of bushels of any one of these varieties to make up a respectable shipment. The plantations of pears are small at the best, and selection of varieties has been made hitherto with an eye to local markets only. Now we begin to find a surplus which these markets cannot use, and we must seek distant markets or sell at losing prices.

Here there is work for our local Associations, viz., to decide upon the markets to be taken up and then plant varieties suitable for these markets, and in quantities sufficient to make proper shipments.

Again in apples; is it not strange that in no section of Ontario can you find an orchard of Gravenstein? Here is one of the very finest fall export apples, with no competitor that can compare with it in beauty, or in quality for shipment about the 1st of September; an apple that has made the Annapolis Valley famous, and which may be grown just as successfully in Ontario as in Nova Scotia, and yet it is comparatively unknown in our Province.

Another apple too little planted with us is the Blenheim. This fine apple just fills in a gap between Gravenstein and King and brings long prices in the British markets, but who knows of any section in which a buyer could gather up a carload of Blenheim?

In grapes, also, I believe co-operative planting would tell to the advantage of the growers. The Concord and the Worden are grown extensively, but are both wretched shippers. The Worden loosens from the stem and the Concord, though holding on a little better, is too tender in skin and very soon deteriorates. We tried exporting it to Great Britain one season

but the experiment was a failure. This season I tried shipping it to British Columbia, sending it to such points as Rossland, Grand Forks, Phoenix and Greenwood, but in every case they landed in poor condition, though packed with great care.

The question for us to solve under this head is, what grapes can we grow that will carry well and command a good price? Perhaps Wilder or Agawam or Lindley would answer; if so, Associations in grape sections should see that these varieties are planted by their members. Now it is along these lines that our Fruit Experiment Stations are at work, attempting to help in settling the vexed question of what varieties are best suited for planting in each section for profit, and in this work we invite the earnest co-operation of the members of the Ontario Fruit Growers' Association.

The CHAIRMAN: What do you think of the desirability of introducing any new variety of apples?

ALEX. MCNEILL: It would be a dangerous experiment to introduce any new variety too hastily. I think we should experiment with a great many varieties, but we should distinctly discourage the planting of new or unknown varieties. For that reason I commend most heartily the suggestion that Blenheim should be planted. The Blenheim is not as good an apple in many sections as the Baxter, but the man who plants Baxter has to make his market to some extent, whereas Blenheim is well known in England, and there would be no impropriety in planting it in large quantities, as there would be no difficulty in disposing of the crop. When it comes to introducing a new variety with a new name, I should distinctly discourage it among the farmers. There should be years of patient experiment with any new variety, no matter what its merits may be, before it should be recommended for extensive planting. I commend the spirit of the address most heartily. The idea of co-operative planting, and thus doing things on a larger scale, is in complete accord with the recommendations of the Department with which I am connected.

The CHAIRMAN: You do not call Gravenstein a new variety?

Mr. MCNEILL: No, you would be perfectly safe with it.

The CHAIRMAN: I understand that the commission merchants complain bitterly as to the great number of varieties which come to the commission houses in small quantities. If you introduce another variety such as Gravenstein, unless it could be introduced very widely, would it not still further increase the difficulties of the commission men?

Mr. MCNEILL: You can sell Gravensteins in considerable quantity anywhere and at any time. A man who has a carload to dispose of can make a fairly good bargain. If it could be put on the market in car lots, it would be at no disadvantage. It would be very different from planting new and rare varieties, because in the latter case you could not sell your crop to advantage.

Mr. A. E. SHERRINGTON, Walkerton: Gravenstein does not do well in my section, but Blenheim does excellently.

Mr. W. H. DEMPSEY, Trenton: I do not think there is any difficulty in selling Gravenstein if you have from ten to twenty barrels. The Ottawa market will take them readily and at an advance in price over other apples of that season. I think Gravenstein could be grown to advantage in our section. Blenheim is slow in coming into bearing and in some sections it does not produce in sufficient abundance.

Mr. MCNEILL: In Nova Scotia they discontinued planting Gravenstein to any extent because transportation facilities were such that they could not be sure of getting the fruit to market safely, but during the last two years

these facilities have improved so much that this variety is again becoming the best paying apple they grow. It has become very subject to collar rot there, however, and is such a weak tree that they are afraid to plant it on that score.

Mr. Woolverton: Gravenstein is one of the finest and most vigorous growers I have in my orchard. The fruit is very fine. Just as good as any in the Annapolis Valley.

Mr. Robertson, Lindsay: For what section would you recommend Blenheim?

Mr. Woolverton: I think it succeeds in your county. It certainly is a success in the Niagara Peninsula.

Mr. W. T. Macoun, Horticulturist, Ottawa: I find Blenheim one of the tenderest varieties we have at Ottawa. I should be afraid to plant it at Peterborough. Gravenstein is also very tender with us.

A Member: In the vicinity of Belleville, Blenheim stood the test of the recent severe winters.

Mr. Harold Jones: With me Gravenstein is weak and has been killed back. Blenheim has been killed outright.

Mr. Dempsey: One of the reasons why Gravenstein is tender is that it bears heavily each alternate year. If a severe winter follows a heavy bearing season, the tree will be injured.

DESIRABLE NOVELTIES AMONG APPLES.

By W. H. Dempsey, Trenton.

We hear a great deal nowadays about new varieties being introduced, and about hybridization. We are apt to lose sight, I think, of the great work done thirty or forty years ago by some of the members of the Fruit Growers' Association who were among its founders. Charles Arnold worked on the Spy and Wagener and produced the Ontario and several sisters to it, but the Ontario is the best of his creations. From the union of Spy and Golden Russet, my father, Mr. P. C. Dempsey, produced Trenton and Walter. Trenton is one of the best early shipping varieties we have, and has never sold in Liverpool or Glasgow, at less than twenty shillings a barrel. In small fruits there are a number obtained by crosses made by Dr. Saunders when at London. At the present time Mr. Macoun is also doing a very important work in the production of new varieties.

We should, however, be very careful about recommending the planting of new varieties. We have a lot of old varieties which are widely grown, and it is easy to select from them varieties which will suit any apple growing section. Blenheim requires a heavier soil than some varieties and, where it is suited to the section, it will produce abundantly. The same is true of Gravenstein and Trenton. Trenton on quite light land is the most profitable variety I have. Ontario is larger than Spy with me, but it is, if anything, more tender in the skin than the Spy.

Of the new varieties Coo's River Beauty attracts me more than any other. I received it from a California Experiment Station. The first year it fruited, it did not promise well as the fruit dropped early and was not very good. Last year the fruit hung to the tree until late in the season and kept fairly well. This year the bulk of the fruit was picked last Saturday, and there were fewer specimens on the ground than in any other variety. The tendency to fall off is a great drawback to many varieties, such as Wealthy, Snow, Blenheim, and Cranberry Pippin the latter being one of the worst. Coo's River will class as to quality with the

Snow and the McIntosh and it is as fine in appearance as Wealthy. York Imperial has shown up better with me this season than in any previous season. The trees bore a nice crop this year and looked very promising. Windsor Chief still looks promising, is of fair quality, and hangs to the tree well. Winter Maiden's Blush impresses me more favorably this year than in any season yet. The fruit is very evenly distributed over the tree, which produces a good crop of large apples of good quality. Sutton's Beauty is not doing well and appears subject to green aphis and to twig-blight, and the tree is apparently weak. It is not frozen back but does not come on rapidly.

Mr. WOOLVERTON: What about Salome and Jonathan?

Mr. DEMPSEY: I have had no experience with Salome. The fruit of Jonathan is of good quality but entirely too small with me.

Mr. WOOLVERTON: It grows beautifully in some parts of the United States.

Mr. ARMSTRONG: What district do you represent?

Mr. DEMPSEY: North Durham, Hastings, and Prince Edward, including the Bay of Quinte section.

A MEMBER: Do you find Ontario more tender than Spy?

Mr. DEMPSEY: I have some Ontario but they are nearly all top grafted. Those grafted on hardy but unhealthy wood have shown weakness. I find the Ontario subject to canker and that it is a poor slow-growing tree.

Mr. SHERRINGTON: My Ontarios on their own stock are useless, but top grafted on Crabapple stock, they are quite hardy.

Mr. DEMPSEY: I have seen Ontario trees 12 years planted in Hastings county that are perfectly hardy and in good condition. They bear early.

Mr. MACOUN: We have top grafted about ninety varieties of tender apples on hardy stocks, the idea being to find out whether the stock made the tree any hardier. We find it does not. It makes a difference if the trunk is tender, such as Ontario. In that case it is good to top graft on a hardy trunk. As regards the new growth, the hardiness of the stock does not influence it. Spy top grafted on Duchess killed down to the stock. Where two varieties were grafted on the same stock, the tender one was killed outright and the hardy one left.

Mr. DEMPSEY: If you graft a hardy variety on tender stock, does it not have the tendency to make the top tender?

Mr. MACOUN: I can give no opinion as to that. Where a tree has a weak trunk, there is no great advantage in top grafting. It is well known that top grafting on hardy stock increases earliness.

Mr. ROBINSON, Lindsay: McMahon White is very successful with me. The tree is healthy, the most hardy we have and bears annually.

Mr. DEMPSEY: It is not a good apple to market on account of the color, but it is well liked for cooking purposes.

Mr. ROBINSON: We find that Ontario on its own stock dies out in our district. I grafted it on Duchess and it did well until the severe winter of two years ago, when every branch was killed.

HARDY CHERRIES.

By G. C. CASTON, CRAIGHURST.

Situated as I am half way between Georgian Bay and Lake Simcoe and away from the moderating influences of the Great Lakes, I am unable to grow successfully any but the sour varieties of cherries. The winter of 1903-1904 was the coldest in twenty years, and the varieties that survived

may, I think, be classed as perfectly hardy. Among these are Orel 24 and Ostheim. Orel is one of the best we have, and my favorite among the Russian cherries. It is not a fast grower but is very hardy. The fruit is very nearly black when ripe and of very fair quality. Next on my list to Orel 24 I would recommend Ostheim. Dyehouse is another good variety but the tree is not long lived and was injured during the winter I referred to. Russian 207 is third on the list. It is a large bright red cherry, and it is of better quality even than Dyehouse or English Morello. The latter is the finest cherry in my section; it begins to bear early and yields very abundantly, but I do not consider the quality good. Dyehouse is smaller, but is decidedly of better quality; I do not know which of the two is the earlier bearer.

Mr. WOOLVERTON: Dyehouse is earlier with me than English Morello.

Mr. CASTON: They are pretty nearly alike in season with me. I have tried the better kinds of cherries but none of them have survived and therefore cannot be recommended for planting in my section.

Q. Do not sour cherries pay better than the others?

A. I think they do. People are planting more of them at any rate.

Mr. WOOLVERTON: Montmorency is one of the best sour cherries. Can you grow it?

Mr. CASTON: The trees are growing nicely but have not fruited yet. As to susceptibility to black knot, all varieties seem to be affected more or less.

Q. Have you tried spraying as a remedy?

Mr. CASTON: I believe that spraying on the bare trees with bluestone is a good preventive. It should be followed later on by Bordeaux mixture. The trees should be sprayed before the leaves come as after that it is very difficult to reach the spores. Instead of two pounds of bluestone in forty gallons of water, I use three.

Q. I have a large number of seedling cherries on my farm four or five years old. If I cut them off and allow shoots to come up, can I bud on the shoots?

Mr. SHERRINGTON: I had some cherries girdled by mice. I sawed them off below the girdle and grafted to Morello and Bigarreau. They are now growing finely. At the time of grafting they were from one and a half to two inches in diameter.

Mr. MACOUN: Cherries must be grafted before growth starts in the spring.

Q. Could you grow sour varieties satisfactorily on this seedling stock?

Mr. MACOUN: Sweet cherries do well on sour stock and I think the reverse would be all right if you can graft successfully.

Mr. SHERRINGTON, Walkerton: In my district we can grow cherries that are unsuccessful with Mr. Caston. I have twenty-five varieties in my experimental plot. During the last two winters we lost the majority of those in the Bigarreau and Duke classes and I would not recommend for our district any of the varieties in those classes. The varieties I rcommend are English Morello, Montmorency, Ostheim, Early Richmond. All these survived the recent severe winters,, but fruit buds were killed on Early Richmond and Montmorency. I consider English Morello the most profitable Morello the most profitable cherry we have. Dyehouse has not yet fruited cherry we have. Dyehouse has not yet fruited with me but promises well. It is an early variety and, I think, may be included in the list. As to spraying for black knot, I believe in spraying with bluestone alone early in the

season before the buds burst. With reference to the failure of municipalities to enforce the law regarding black knot, in our district we have overcome the difficulty in this way; when our local Fruit Association was organized we petitioned the Council for an inspector. We had sufficient influence to get one appointed and to get the Council to see that he properly enforced the law. Black knot is rapidly disappearing in our section in consequence.

VARIETIES OF CURRANTS FOR PROFIT AND HOW TO GROW THEM.

By A. W. Peart, Freeman.

I have had a number of years' experience in the growing of currants. In regard to soil, a rich, moist, cool soil gives the best result. Where the soil is very fertile, satisfactory returns can be had among orchard trees. Shade is afforded in this way which is often beneficial, as there is less liability to sun-scald than when the bushes are planted in the open. This is especially true of red varieties. The best results are obtained from wide planting, the distance apart depending on the variety. As a rule, reds may be planted closer than blacks. For the average plantation six by six or six by seven is advisable. It is safer to plant in the spring than in the fall, unless the soil is naturally well drained. If the land is low and wet the plants heave, and are found lying on the surface in the spring because they have not had time to become established before winter caused growth to cease. I prefer planting early in the spring, and when the soil is reasonably dry. I never plant trees or bushes of any kind in the mud.

In regard to pruning, my practice is to prune in the spring, although I do not object to fall pruning if there is time. March is the best month. In red currants I thin out the old wood, and cut back the strong, young shoots, leaving sufficient cane to give a good crop. All wood over three years old should be removed, and, if the bushes are making vigorous growth, the three year wood may go, too. Red currants bear on two year old wood but the blacks do not. They are more inclined to bear on wood of the previous year's growth. For this reason they are not cut back so closely. I prefer the bush form to the tree form, especially where the currant borer is found, because in the tree form, if the borer attacks the stem, the whole bush is lost. I have divided the varieties I have tested into three classes, desirable, doubtful and undesirable. I find, however, that the varieties placed under these three headings differ greatly from year to year. Among the red currants there are two distinct classes of plants, one having a dark foliage, and the other a much lighter foliage. The lighter greens are, I find, the more rugged. In red currants I would recommend the following: Cherry, Wilder, Old Victoria, Prince Albert, North Star, Fay's Prolific. In black varieties, Naples, Saunders, Lee's Prolific and Collins' Prolific. Among the white varieties White Grape is productive, but White Imperial stands first on the list for quality. Among the doubtful varieties I would class Champion, New Victoria, Pomona, Red Cross. In undesirable varieties I include Belle de St. Giles as being the least productive of any of the red currants, also Brayley, which is small and unproductive. Raby Castle may, also, be classed as undesirable, being too small in the fruit, as are also Red Dutch and Versailles.

Q. Which is the largest of the black varieties?

A. I think Collins' Prolific. For some time the demand was poor, and prices for currants were low. The last year or two, however, has seen a change in this regard, and many growers have realized encouraging profits. With ordinary planting, twelve hundred bushes may be set to the acre. These should average three quarts per bush, which gives 3,600 quarts per acre. Recent prices have netted over three cents a quart, after paying for package and picking.

Mr. Joseph Tweddle, Fruitland: I think the tendency is to plant currants too closely. I have a plantation where they were originally set out six feet by four. Bushes have been removed until they are wide enough apart to permit a team to work between them. The result is that three times the crop has been realized. I am in favor of spring pruning. My experience with dark-leaved varieties is that, if pruned in the fall, they will die back very badly. I have found a great improvement in the growth and health of my bushes after I discontinued fall pruning.

Q. How long do you find it profitable to keep your bushes?

Mr. Peart: Not after they are eight or ten years old.

Mr. Tweddle: By planting ten feet apart and four feet apart in the row, you will have a thousand plants to the acre. I sow a cover crop just as in the orchard.

Q. Do you cultivate both ways?

Mr. Tweddle: No, only one. In regard to spraying currants, when our bushes were nine years old, and were beginning to die out, we sprayed them with lime and sulphur in the spring, and they became almost as vigorous as a young plantation. They were suffering somewhat from fungous growth.

HARDY FRUITS.

By Harold Jones, Maitland.

The question of hardy fruits cannot be discussed without due reference to locality. What may be a success in Northumberland and Durham may be an absolute failure east of Kingston. The thermometer does not show a great difference in temperature in the two sections, possibly three or four degrees, but there is the lake influence, which reaches much farther back through the Counties of Northumberland and Durham than we are perhaps aware of. A talk upon the various fruit districts of the Province would form a very interesting subject, but I must confine myself at present to the St. Lawrence Valley district, between Stormont and Cornwall. This is known as the Snow apple section. As the result of my experience as a fruit grower, running over a period of twenty-five years, during eight of which I have been engaged in experimental work, I may say that we still have to look for something better than the Snow, McIntosh, Scarlet Pippin and apples that are somewhat kindred to them according to parentage, such as Trenton. The first three are our leaders in that section. When parties come to me as an experimenter, I cannot conscientiously advise them otherwise than to stick to the varieties that are giving us the most money per acre, and, possibly, as much money per tree, as any other varieties we can plant. These varieties are all of pretty much the same season, and we now have to look for apples of commercial value which will extend the season through the winter. We have some valuable early varieties, such

as Alexander, Wolf River, and the Baxter. These bring high prices, sell readily and export well. Trees of the Wolf River and Alexander are comparatively hardy, and may be classed as ironclads in the St. Lawrence Valley. Alexander will sometimes show a tendency to rot on the trees in individual instances, but, as a rule, the crop is picked in first-class condition, and is not subject to fungus or spot. The variety is readily attacked by the codling moth, but in our section we are particularly favored. In Western Ontario there seems to be one continuous brood from early in May till late in the autumn. We have two distinct broods, a spring brood, which appears shortly after blossoming, and a midsummer brood about the middle of July; between the two there is a distinct intermission. Therefore, if we give proper attention to spraying at the proper time in the season, we suffer but little loss from this pest. My experience, after fourteen years of spraying, is that if the work is done properly, after the blossoming period, not more than two per cent. of the apples will be found to have suffered injury from the codling moth. In the island of Montreal, Alexander is giving as good money returns as any variety they grow. Wolf River is a close second, and, possibly, may be a better apple, but we have not had it under test long enough to say. The trees of that variety planted in 1896 are showing up well, and the fruit will ship successfully till the end of November. Duchess is a standard variety which need not be touched upon; it does well in our section. Following these three varieties (I leave Astrachan out as not being profitable with us) we come to Wealthy. This variety fills the gap between Alexander and Snow. It is disappointing, however, in our section. Our soil is an alluvial one with a large percentage of clay, which makes it rather heavy. There are, of course, gravel ridges and some strips of lighter soil occur occasionally. Wealthy is subject to canker with us; the tree leans over very much from the prevailing wind; the fruit strips very easily, and does not attain size or quality, except in individual trees grown under favorable conditions. I have watched Wealthy very carefully in various sections when on Institute work, and have obtained specimens of the fruit in almost every month of the winter. My conclusion is that it grows to the best advantage on the slopes and depressions of the Laurentian hills, whch run through the province from the Georgian Bay, following the valley of the Ottawa, and crossing the St. Lawrence River at the Thousand Islands. In my opinion the soils of this Province may have more influence than climate on the quality of our fruit. In studying the geology of our country, we find that the range of hills I have referred to is composed to some extent of rocks that carry a high percentage of phosphates. My observation leads me to believe that certain apples, Wealthy for instance, possess far finer quality, texture, color and keeping qualities where grown on the slopes of these hills, because of the fact that the soils is rich in phosphates. I think this is a point that is worthy of further study. I am satisfied I am on a track of forming a basis in this regard on which we may work in the future in locating the best sections for certain fruits.

After Wealthy come our three leaders, Snow, McIntosh, and Scarlet Pippin. They all have defects, but all are heavy bearers, and come into bearing fairly early. All are subject to black spot. I heard the statement made a few years ago at one of the fruit meetings that Flemish Beauty pear could not be kept free from spot even if a sprayer were kept working continuously on the tree from spring to fall. My experience with it is that it can be kept free from spot easier than the Snow apple by proper and intelligent spraying done at the right time with sufficient force to give a

mist spray, and not a drenching. You can secure from eighty to ninety per cent. of clean Snow apples, you will also obtain better sized fruit by keeping the foliage clean. There is still need of much missionary work in regard to spraying. In our locality we find people who will not spray because they have to use lime. They do not know how to handle it, and it clogs the nozzle and gives trouble generally. Trees should be sprayed twice, the last spraying coming about July first, after which the crop is practically assured.

The three varieties I have mentioned do not last longer than Christmas. They will keep longer, but the market demands certain varieties at certain seasons. The consumer is looking for these varieties now, and will continue to do so until about the third week in December; after that time winter varieties are in requisition. This is a point worth considering. The market for these varieties is very extensive, and we cannot grow enough to fill the demand for these apples in their season, but they must be in the consumer's hands by the first of January.

Mr. Kydd: What is the variation in season of these three varieties?

Mr. Jones: The Scarlet Pippin is slightly earlier, and should be picked first, because it drops easier than the others.

Mr. H. B. Cowan: The experience in the Ottawa Valley is that Scarlet Pippin keeps longer than either of the other two varieties.

Mr. Jones: Yes, but it loses its crispness and flavor. It is not a question of how long an apple will hold out, it is a matter of when it will bring the best price in the market,—that is the time to sell it. I think that the most valuable work before the Experiment Station for the East is to try to find a profitable winter apple, which will some in after the varieties mentioned. So far we have not got such an apple. Spy shows fair hardiness with us up to the time of full bearing. After bearing one or two full crops it begins to show defects, and dies off, and that, after taking from twelve to sixteen years to come into bearing. I imagined at one time that I was going to have something that would take the place of the Spy in the Ontario. I started in by planting 106 trees. I took care of them for four years, but after the freeze of 1903 I cut them all down.

Mr. Macoun: He would not take our advice. We had had experience with Ontario. That is where people make a great mistake. These Stations are for the purpose of testing the hardiness of apples, and the men in charge of them are there for the purpose of giving advice to the people of the district. If the people will take that advice they will often save themselves thousands of dollars.

Mr. Jones: Each year I have more people coming to me for advice on this subject.

As to Baldwin and Greening, it is definitely settled that they are not hardy in our section. I have Ontario, top grafted, which is just below an open wind break and escaped the freeze of 1903. I suppose the weakness of Ontario is due to the fact that the fruit bud is not properly matured in the fall, and that the cold winds destroy the vitality of the tree. Although we have not yet secured a profitable winter apple, I think the time is approaching when we shall do so. The most profitable winter variety we have is Golden Russet, but it wilts in ordinary storage and gives a slack package. It also loses its crispness and juiciness, and it is only at certain times in the year that Russets are A 1; after that they become second grade. Ben Davis attains neither size nor color; North West Greening has many good qualities, but lacks color, and, on that account, it has to take its place on the market with Rhode Island Greening.

Mr. Sherrington: Is it subject to spot?

Mr. Jones: Slightly, but not as much so as the ordinary Greening.

Mr. Sherrington: I would class it below Ben Davis for my district.

Mr. Jones: As to McMahon White, the chief point regarding it is that it is one of the best varieties I have found to top graft on. It has strong vitality, is perfectly hardy, and has one of the best crotches of any tree I ever saw. You cannot do better than use this variety, especially if you wish to bring an apple into early bearing. The next best variety to McMahon is Hibernal. Pewaukee does not compare with it and Tolman Sweet has not the same vigor. I find that that there is always a market for a good cooking apple, and the most promising variety we have of this description is Milwaukee. It has a sharp acid but no very decided flavor and is not, of course a table apple. It keeps its acidity and does not get flat. It is especially valuable in the western market and commands a price right through the winter. It should be remembered that more apples are sold for cooking purposes than for dessert, probably the proportion is ten to one. Another profitable cooking apple is Scott's Winter. It is a bright red and very hardy but has the fault of running small after the trees come into bearing. It is an annual bearer and a good yielder. It has a sharp acid and will keep its quality until June and is a first class cooker.

Q. Is there any reason why you should not have a first class winter table apple?

Mr. Jones: I do not know why we should not. We have cooking varieties that will hold their quality, and I see no reason why table apples should not be found which will do the same. Mr. Macoun is now engaged in hybridizing and crossing early winter varieties with our later keeping varieties, and I think we shall eventually secure what we require in this regard. The best varieties we now have originated largely from chance seedlings. McIntosh Red was of this description but it was one of a million. It no doubt resulted from a natural cross of two varieties. Mr. Macoun may be able to get one out of a thousand seedlings by intelligent crossing. He has a great work before him, and I hope he will live to see great results.

Mr. Robertson, Lindsay: I have grown Phoenix very successfully. It is similar in appearance to Milwaukee.

Mr. Jones: I do not know it.

Q. Have you had any experience with Cooper's Market?

Mr. Jones: I have no trees of that variety as yet. I have about sixty-eight varieties and have mentioned only the most promising ones. I have a very long list of undesirable varieties. Salome was planted in 1896 and up to the present has grown three or four crops, but the fruit is absolutely worthless—it lacks size, is uneven in form and a poor apple in every way.

Mr. A. McNeill: The Fruit Division at Ottawa is frequently asked to identify Phoenix. It looks not unlike Canada Red. Phoenix is one of the most profitable apples grown. When I say that, I do not wish to be understood as recommending its planting. It is no more profitable than Ben Davis. It is a good shipper, and if it had been universally planted years ago, so that large quantities could have been shipped, I think it would have been as profitable as Ben Davis. It is sweetish and insipid in quality.

The Chairman: Has anyone present had favorable experience with Salome?

Mr. McNeill: I know of a most successful small orchard of this variety, owned by Mr. Zavitz, of Coldstream, Middlesex County. It should never be grown in the colder sections. I would not recommend it anyway as it is just an additional variety.

Mr. Sherrington: Our trees are doing splendidly.

Mr. McNeill: You will not get fruit of good size.

Mr. Jones: Mr. Huggard of Whitby unfortunately reported the variety as very desirable some years ago, but on further test it proved worthless for our section, and we must try to counteract the impression that has gone forth regarding it.

Q. How do you regard Baxter?

Mr. Jones: It is quite a profitable variety with us and may easily be classed as hardy. There is some tendency to sun-scald. Trees of sixteen to twenty years old yield from one to one and a half barrels and the price received is from $3.00 to $3.25 per barrel.

Q. What about Blue Permain?

Mr. Jones: It is a very handsome apple of midwinter class, and is of rather high quality as a table apple. It is a shy bearer, however. My trees are from thirty to thirty-five years old, and from two to two and a half barrels is an average crop, so that it is less than the Spy in yield.

The Chairman: We must keep in mind the fact that Mr. Jones is talking of varieties adapted to his district, where they require hardy apples. He is not discussing varieties for the warmer sections.

Mr. Reed: Delaware Red is quite as hardy as anything Mr. Jones has mentioned, and it is a good keeper.

Mr. Macoun: It is a hardy apple, but not sufficiently so for the district. We thought so until two or three years ago when we had an exceptional winter. We may not have another exceptional winter for twenty years, but if it comes along just as your trees are commencing to bear nicely and kills them out, your loss will be a severe one. We have crossed this variety with McIntosh Red because it is one of the best keepers we have. I have kept it in an ordinary cellar over two seasons. I would not add it to Mr. Jones' list. It is not sufficiently hardy, and the fruit is inferior in size, too much of it grading as number two.

Mr. Jones: That is the reason I spoke of Milwaukee, whose parent is Duchess. The tree takes care of itself, and does not require pruning. It does not grow a lot of extra wood for nothing, but is a business tree from the start. Besides this, it bears a high percentage of No. 1 fruit. It is practically free from spot. Keep away the codling moth and fertilize your trees, and spraying will be reduced to a minimum. The result will be a crop of high class commercial fruit with a small amount of labor and expense.

Mr. Robertson: Bellflower does well in our section.

Mr. Jones: We consider it one of our finest winter apples, but it does not meet with favor in the market, as its shape and color are both against it. It goes to the export market as Bishop's Pippin, but the Bishop's Pippin of Nova Scotia is superior to Bellflower. It seems that Paris green added to the soda Bordeaux mixture is very injurious to foliage, and I think this subject should be brought up for the benefit of Institute speakers so that they might be in a position to explain why this is the case.

Prof. Shutt, Ottawa: The soda Bordeaux mixture was recommended by the Provincial and Dominion authorities for use on potatoes. It was introduced by Institute speakers last winter, and considerable interest was taken in it. As it is much easier to make than the ordinary Bordeaux, people have used it for other purposes, and, as they have been in the habit of adding Paris green to Bordeaux, they added it in like manner to the soda Bordeaux mixture. In consequence of this much injury was done both in Ontario and Nova Scotia to foliage and fruit. The reason for

the trouble is this: When Paris green is added to soda Bordeaux, arsenide of soda is formed. This is injurious to foliage, and cannot be used even in a very dilute solution. It does not injure potato foliage, however. We found from our experiments that it injures apples, plums and cherries, and, particularly, plums and cherries. Some varieties of apples were less affected than others, but all were affected more or less. There is another point in connection with the use of soda Bordeaux that should not be lost sight of, namely, that it has to be used within twenty-four hours of being made or it will become granular, and will not adhere to the foliage.

RASPBERRIES FOR PROFIT: VARIETIES, PRUNING, AND PLANTING.

By A. E. Sherrington, Walkerton.

Last year I recommended the following varieties in red raspberries, namely, the Reliance, Turner, Marlboro, Cuthbert, Phœnix. Loudon was also included in the list, but his was a mistake; it is not a satisfactory variety. I have a few changes to make in this list. I find that Reliance and Turner are too small for good market varieties, although their quality is excellent. Marlboro might also be improved upon as an early variety, as it does not make cane enough. Perhaps a cross between Marlboro and Cuthbert would produce a more vigorous plant and an earlier berry. Marlboro is a large berry of good color and a good shipper, but the fruit is dry and crumbly.

Q. Are there not two or three different kinds of Marlboro?

Mr. Sherrington: The difference is in the habit of growth, not in the berry. Herbert fruited with me for the first time this year. This variety was originated by Mr. R. B. Whyte, of Ottawa, and from one year's experience I have to place it at the head of the list. The plant is not so vigorous as Cuthbert, but is, I think, sufficiently so. It is the largest berry I have, being three-quarters of an inch in diameter as against half an inch for Cuthbert. Cuthbert still stands at the top of the list as the best all round berry grown. The first fruit of Cuthbert was harvested July 19 and it yielded 347 ounces by the middle of August, when the crop was over. It is a hardy and vigorous grower and the fruit is in great demand in all sections. The first fruit of Herbert was picked on July 17 and the last on August 11. In that time a crop of 665 ounces was taken off a twenty-foot row. The quality was fine, and it proved to be a good shipper. In Marlboro the season lasted twenty-nine days, beginning on July 13, and the crop realized was 330 ounces. Turner came in on July 11 and yielded only 257 ounces. The first Phœnix were picked on July 13 and the crop, which was concluded by August 13, amounted to 330 ounces. The fruit of this variety is small, but as a rule it is a regular and heavy yielder. The fruit is of good quality and I should not like to discard this variety.

Black raspberries have been a comparative failure recently owing to the work of anthracnose. Hilborn is the hardiest and best, but the fruit is small. Conrath comes in earlier, but is not so hardy. Older is perfectly hardy but the fruit is shiny black and lacks the characteristic bloom. It is not popular on the market on that account. It also has a very short fruiting period. During the past season the crop was taken off in four pickings extending from July 13 to August 1, and the quality is only fair. The yellow and

white varieties are not needed in the commercial market. Golden Queen is perhaps the best of them.

Mr. Woolverton: Is not Brinckle's Orange of better quality?

Mr. Sherrington: But the plant is not as good. I have tested a considerable number of purple varieties. Columbian is the hardiest and the best yielder, but I prefer Schaffer, as it is of better quality. I can find no market, however, for purple berries.

Q. Schaffer is in demand as an early canner?

Mr. Sherrington: It is necessary to have the ground thoroughly cultivated and perfectly free from grass before setting out the raspberry plantation. Cultivation and fertilization are the two main factors in securing a good crop. I am very much in favor of spring planting as against fall planting. The plants should always be set deeply because the roots are surface feeders and they should be kept down as low as possible. The method I adopt in planting is to make a furrow with the plow and then turn out another along the same bottom. The bushes should be set in this trench and the roots well covered. Rows six feet apart give good satisfaction. The suckers are allowed to spread until a hedge row is formed thirty to thirty-six inches wide, a space of three feet is maintained between the rows. This system is convenient for working with a horse cultivator, and is especially adapted to plantations set out between the rows of orchard trees. A suitable arrangement is three rows of berries and the outside rows nine feet from the trees. When the tree rows are thirty feet apart this plan has been found to work satisfactorily. A fruit plantation requires plenty of fertilizer. Some growers rely solely on the commercial fertilizers. It is true that in this way weed seeds are avoided, but it also results in deficiency of humus and a compact surface soil. Shallow cultivation is necessary as the roots gradually come near the surface, and if the soil is cultivated too deeply, they are liable to be destroyed and the supply of nourishment cut off. A one-horse cultivator, which will work up the ground to a depth of two or three inches, used once a week or oftener in dry weather, will be found suitable. I do no summer pruning of raspberries, as the practice permits of the growth of late laterals and numerous suckers. If there is time, all the old wood is taken out in the fall. If not, this work is done in the spring after the fruit trees have been pruned. At this time, too, the canes are cut back. Great judgement is required in cutting back canes. In some cases the canes have made rank growth. If there is a sufficient number of buds low down, the canes can be cut back much more severely than if the buds are higher up. All canes that have been damaged by frost should be removed. The canes are thinned out so as to leave the strongest ones four to six inches apart. My raspberries, which were cultivated under the above method, yielded me last season from twenty-three rows, three hundred feet long, planted in a young apple orchard, about 3,600 boxes. These netted seven cents a box.

Q. What would be a good yield for an acre?

A. From three to four thousand boxes.

PEACHES FOR PROFIT: PRUNING AND WINTER PROTECTION.

By W. W. Hilborn, Leamington.

A larger and better peach is demanded by the market to-day than was required some years ago. The present demand is for a peach of large size, good color and fine quality. We should have varieties of this kind which would cover the entire season and we do not at present possess such var-

ieties. We also require better shipping varieties in order that we may extend our business. The Elberta is perhaps our best peach. When grown to perfection it is very fair in quality, of good size, good color and will stand shipping well. It thrives best on high, dry, sandy soil, and the trees should be well thinned out to admit plenty of sunlight.

Q.—Is not the soil you mention the best kind for any variety of peach?

Mr. HILBORN: It is the best peach soil for color and quality. I do not think I should care to plant on any other kind of soil.

Q.—Have you ever seen Elberta grown on light gravel?

A.—I have grown it on such soil but the fruit does not obtain the same size.

Q.—If we were to draw the line as closely as you do in regard to soil, there would be very few peaches grown.

Mr. HILBORN: I suppose you cannot get that soil everywhere. The chief point is to see that the roots of the tree will not run down to water, or good results will not be secured in the quality and color of your fruit. We have fruited about 150 varieties, some quite extensively, but others only in limited numbers. The market demands a yellow peach. Very few white peaches are asked for even though the quality may be as good or better. White-fleshed varieties do not stand shipping well as a rule, and by the time they reach the market, they are usually in bad condition; but for my own use I prefer them. The following are the varieties I would recommend for my district: In early peaches, the Alexander and Greensboro. These are white varieties, as you cannot get a yellow peach of the same season. They produce a nice peach on suitable soils, but I would not recommend planting them in large quantities. Next come St. John, Early Crawford and Garfield.

Q.—Do you not find that Garfield ripens before Crawford?

A.—There is very little difference one year with another. Then come the following in order of ripening: Garfield, Fitzgerald, Prolific, Engle, Mammoth, Elberta, Gold Drop, Bronson, Kalamazoo, Smock, Banner.

Q.—Would you not include late Crawford?

A.—It does not bear well enough to be profitable with us.

Q.—Is not Kalamazoo a very small peach?

A.—Not with me.

Q.—Do you not include Sneed?

A.—No, because of its small size and poor color.

Q.—What do you consider the hardiest peaches?

A.—Those of the Crawford type, Fitzgerald and New Prolific.

Mr. ROBERTSON, Lindsay: I grew Fitzgerald at Lindsay and exhibited the fruit at the Fall Fair two years ago, but the trees were killed the following winter.

Mr. WOOLVERTON: What advantage has Fitzgerald over Crawford?

Mr. HILBORN: The trees produce younger, the fruit colors better, yields better and averages equally well in size. The tree is also a little hardier.

The CHAIRMAN: I observe that the list Mr. Hilborn gives us this year does not agree with last year's list.

Q.—What is Kalamazoo like?

A.—It most nearly approaches Gold Drop and is about the same size. The trees are inclined to over-bear and have to be thinned. As to pruning; very much depends on the pruning as to whether you will have large or small fruit. To secure good peaches, the trees must be properly pruned to admit sunlight throughout and the fruit thinned out sufficiently.

Q.—How high do you head your trees?

A.—From two to two and a half feet from the ground. In some districts they consider this too low to work under. If you head high enough for horses to pass under, it takes a long time to get a large crop, and even then you do not get as good fruit as with low-headed trees, and the latter are not so much affected by wind. The only disadvantage is in cultivating the orchard·

Q.—Do you both prune your trees and thin out your fruit?

A.—I like to prune the wood early in the spring and thin out the fruit as required. The difficulty in thinning peaches is that if we do it ourselves, we do not remove half enough of the fruit, and if we set someone else to do it, they do not discriminate between good and poor fruit. I aim to pick out small, ill-shaped fruit.

Q.—Is it not more profitable, under present labor conditions, to prune well with the shears and leave out the thinning?

A.—To get the best results trees should be thinned if they are overloaded, and you cannot always regulate it with the shears. To secure the best peaches, they should be thinned to four or five inches apart.

Q.—What would be the cost of thinning a twelve year old tree?

A.—One man should do it in an hour. I find if we thin down to what appears to be about half the crop, the money returns are better than if the trees are untouched.

Q.—If it takes an hour to thin a tree, how would you get sufficient labor to thin say four thousand trees?

A.—At the time I speak of we had twenty thousand trees and the work took from two or three weeks with from four to six men employed. We thought it paid us. The peaches have to be picked any way and labor is more readily obtained at the time of thinning than later on in the season, and less care is required to pick green fruit. Then, too, it costs as much in soil fertility to produce the pit of one peach as it does the flesh of three or four.

Q.—When do you begin to thin?

A.—As soon as the peaches are well set and large enough to work upon. My practice it not to thin too closely the first time, but to go over the trees quickly as it tends to prevent fruit from dropping.

Q.—Don't you think that much of the cost of the thinning might be avoided by judicious pruning and heading back the laterals? Do you practice heading back the laterals to a certain number of buds or do you thin out the main branches and let the laterals go?

Mr. Hilborn: I do not cut back the laterals.

Mr. Armstrong: I think you would save hundreds of dollars in thinning if you would use that method of pruning.

Mr. Hilborn: We try to thin at the time of pruning so as to leave the tree as nearly right as possible and then thin afterwards if required.

Mr. Woolverton: Do you think you will be able to successfully grow peaches in Essex by any method?

Mr. Caston: I think it could be done by grafting peaches on plum stock.

Mr. Hilborn: I have not tried it myself, but had the same idea, and I wrote to a number of parties across the line who had followed that method and they pronounced it a failure as the graft would not unite properly. As to winter protection, one of our difficulties is that our best peach land is high, dry, sandy soil. On land of this kind if we get a winter without any snow and long continued cold, the frost enters sufficiently into the ground to kill the roots while the tops remain uninjured. We have tried a number

of cover crops without very satisfactory results. On our soil we must cultivate till about the first of August, and if we sow a cover crop after that time, we cannot get sufficient top to give protection; or if we do get a fair crop, we do not get it immediately around the tree, where it is required, as it will not grow there with sufficient vigor.

Q.—Would not rye answer?

A.—It is perhaps as good as any but does not give sufficient cover. Next year we intend to grow early tomatoes among the trees and after they are through, by September 1st, we shall take the vines and pile them around the trees covering them with a little earth.

Q.—Are you troubled with mice?

A.—We have no mice. If we keep our fences clean and cultivate our orchards, mice do not trouble us.

Q.—Would not sawdust be useful in this connection?

A.—It sours the soil and some growers claim that two or three applications will kill the trees.

Q.—How do you treat borers?

A.—We hunt them out in the spring and destroy them. We also apply a mixture consisting of one bushel of lime, one bushel hard wood ashes, one pint crude carbolic acid, with sufficient water added to form a cream. After the borers are picked out in the spring, this is applied from the roots to the limbs.

Mr. Jones: We use linseed oil on apple trees with good results.

Mr. Woolverton: The apple tree borers work only in summer time, and a little soft soap will keep them away.

REPORTS OF EXPERIMENTERS.

APPLES.

NOTES BY W. H. DEMPSEY, (*Bay of Quinte Station*).

The apple crop was very light in this district this year, there being not more than one-third of a crop. There are several reasons for this. The trees may not have recovered from the effects of the severe winter of 1903. Some that were in an unhealthy condition last year have died this year, and many individual limbs which bore heavily in 1903 have died this season, while the remainder of the tree is apparently sound. Again, the cold foggy weather at the time of blooming may have lessened the crop for only those not in full bloom at that time were heavily loaded. The codling moth, which was very numerous, has also tended to lessen the crop by causing so many apples to drop. The curculio also had a share in the destruction of the crop by causing in many orchards many barrels of apples to become ill-shapen and unfit for market.

There was very little spot on the apples, and only in locations favorable to it, where it appeared late in the season.

The fungus on the foliage did considerable damage by causing it to turn yellow and drop in August and September, which left the wood unripened for winter, and the fruit exposed to the sun to ripen prematurely. This was most noticeable on the Baldwin, Stark, King, Seek, Fameuse, Greening, Russett, and Ben Davis.

COO'S RIVER BEAUTY is improving each season; it bore a fine crop again this year which hung to the tree until the first of November, with very few windfalls. At present it appears to be one of the most promising of the new varieties which I have; quality good.

BOIKEN is still maintaining its good fruiting qualities, and the fruit is of good size.

MILDING: Planted in 1896; a very vigorous grower, making large handsome trees; requires but little pruning; tree spreading, has produced very little fruit; evidently requires age before fruiting. Fruit, large, striped and splashed with red; medium quality.

ROME BEAUTY: Fruit running much smaller; tree not a vigorous grower, looks as though it were becoming unhealthy.

SUTTON'S BEAUTY: Planted 1894; still making very little growth; bore only a few specimens this year. It is too weak a grower and too slow in fruiting to be of value here; possibly it might do better top grafted on good stock; have not tried it.

SHIAWASSEE BEAUTY: Planted 1894; has made slow growth, producing good crop each alternate year; this year nearly one barrel of mostly XXX fruit; fruit good size, color and quality; excellent for cooking, and dessert; season, October and November.

YORK IMPERIAL: One year old, planted 1898, made medium growth, handsome tree, heavily loaded this year for the first, has a far more promising appearance than the scions top grafted on yellow Bellflower in 1897, which have borne only a few specimens. The fruit is handsome, light red; keeps good till spring, medium quality.

NOTES BY HAROLD JONES, (*St. Lawrence Station*).

My notes on 22 varieties published in the Report of 1904, do not need repeating. The following varieties fruited with me this year.

AKEN'S RED: Planted 1897; yielded a fair crop of medium sized, dull red apples, of no special value; fruit subject to fungus spot.

DOWNING'S WINTER MAIDEN'S BLUSH: Planted 1896; bore a crop of about 15 apples; fruit large, similar to Maiden's Blush in color and markings; a handsome apple of promising appearance.

GANO: Planted 1900; a few specimens similar in size and form to Ben Davis; a handsome deep red apple; promising.

HURLBUT: Planted 1896; yielded a good crop of rough uneven fruit of no special value; not desirable.

MAGOG RED: Planted 1896; bore a fair crop of large yellow fruit faintly streaked; quality medium to poor; does not hold to the tree well; not desirable.

MILDING: Planted 1897; a vigorous healthy tree; yielded a few specimens of large, smooth apples of attractive color; worthy of further trial.

NORTH WEST GREENING: Planted 1896; bore good crops for two years; fruit large, green with color in some cases; a fair cooking apple; tree vigorous and hardy; worthy of further trial.

ROME BEAUTY: Planted 1898; tree healthy and vigorous; fruit large and attractive; worthy of further trial.

SWITZER: Planted 1897; a vigorous, hardy tree coming into bearing young and giving heavy crops; fruit medium size, attractive in color; follows Astrachan in season; drops on reaching maturity, and does not sell as well as Duchess; not desirable here, but might take the place of Astrachan in Northern sections where that variety does not succeed.

WOLF RIVER: Planted 1896; a hardy vigorous tree; a fair cropper; fruit large, handsome; resembles Alexander; meets with a ready sale at good prices; a month or six weeks later than Alexander; an all round desirable apple worthy of more extended trial.

YATES' RED: Planted 1897; a poor, weak grower with no vigor; fruit small, red, of no value; undesirable.

NOTES BY G. C. CASTON, (*Simcoe Station*).

ALEXANDER: I think this apple has come to stay as one of our list of fall apples; perfectly hardy; a good bearer; fruit large, handsome and a first-rate cooker.

WOLF RIVER: About a month later in season than Alexander, in fact it keeps fairly well until Christmas. Tree a real ironclad in hardiness, thrifty, prolific; fruit very large and highly colored, handsome and a first-rate cooker.

COLVERT: This apple still retains its place as a good shipper among our fall apples.

For a rotation, beginning with Duchess, the Peerless would come next; then Alexander, and next Colvert, Wolf River and Blenheim. This would probably be the best list for profit and to cover the season until winter apples are ready to ship.

SNOW, MCINTOSH and WEALTHY are unsatisfactory and give but a small percentage of first-class fruit.

In winter apples, if I were to add any to the list given in former reports, it would be the

Boiken: While not of high quality, it is a good cooker and keeps as well as Ben Davis; it is clean skinned, and colors fairly well here; the tree begins to bear almost as soon as planted and keeps right at it every year; so it could not fail to be profitable. Its color might be against it as an export variety, but it would be all right for the home market, especially in view of its great keeping qualities.

Among the list of undesirable varieties of apples fruited here, I might mention nearly all of the Russians; Scott's Winter, a small, sour scrub. I would consider myself in a bad plight for winter apples if I could grow nothing better than Scott's Winter.

Walbridge: Another worthless scrub, should never have been propagated.

Haas, or Fall Queen: Highly colored and handsome; hardy; but of very poor quality.

Gideon: Healthy, hardy, prolific, but rots at the core and the tree, like Wealthy, has a tendency to overbear and the fruit to run small.

Barry: About as useless a variety as was ever sent out.

Hastings. Worthless here.

Scarlet Pippin. Too small to be of any use and scabby at that; no larger than some of the crabs; worthless here.

Ribston Pippin: Blooms profusely, but never yields a full crop.

Magog Red Streak: Poor stuff; should never have been propagated.

Cooper's Market: Poor bearer; fruit small. If there is anything to commend it elsewhere, it must be out of its latitude here.

Hamilton: An early fall variety; color against it; nothing to commend it.

Sutton's Beauty: No use here.

Fanny: A worthless scrub.

Clayton: Little better.

Montreal Peach: A yellow apple; nothing to commend it.

Blushed Calville: One of the most worthless ever tried.

Winter St. Lawrence: Not favorably impressed with it; may be worthy of further trial.

York Imperial: Too tender here; might do, top-grafted.

Winter Maiden's Blush: This variety is worthy of further trial; it may have a place as a winter variety. The tree is a hardy, thrifty grower and the fruit is clean and fairly attractive, and I would not condemn it without further trial. However, I feel that it is not wise to add anything to the list of winter varieties unless possessed of highly commendable qualities, commercial value being of first importance.

Notes by A. W. Peart, (*Burlington Station*).

The following varieties were top-grafted last spring on a Roxbury Russet tree:—Baxter, McIntosh, Princess Louise, Wolf River, York Imperial; southern apples, Apple of Commerce, Black Ben Davis, Collins' Red, Dyer, Olivet, Rengen Red, Richardson's Russet.

Southern varieties which this year fruited for the first time are:—

Bonum: Top-grafted 1901; fruit very small, red.

Malinda: Topgrafted 1901; fruit medium size, very fine skin, toplike shape, very perfect and symmetrical, red in color.

Swaar: Top-grafted 1901; fruit red, medium size.

These three varieties appear to be late keepers.

NOTES BY CHAS. YOUNG, (*Algoma Station*).

The crop of 1905 in Algoma has been an excellent one, and sold locally at remunerative prices; perhaps the best apple crop we ever had. Fall fruit we can always depend upon, but this year winter fruit, owing, no doubt, to favorable weather, did splendidly. Just here on St. Joseph Island we have gotten past the stage of doubting whether fruit can be grown at all or not; we know it can, and are planting more every year and with good results, now that we know just what to plant. Eastern nurserymen have kept back fruit-growing in the north by unloading unsuitable stuff upon us; in fact, this seems to have been a dumping ground for what could not be sold at home, and many thousands of dollars have been paid for stuff sold by a highly colored picture which we never hear the name of. We are not just quite satisfied yet, although our fall apples will keep much longer than the same grown in the east. We are still looking and trying to get something nearer perfection and a long keeper. Scott's Winter is more extensively grown as a long keeper than any other, but is by no means a perfect apple. It wants clean cultivation, good rich ground, or else the fruit runs small. The demand here is for a larger apple. Then, for the grower, it does not yield enough to the tree, and even with clean cultivation, etc., we cannot grow the fruit to compare with that shown at the F., F. and H. Show in Toronto in November, 1904. With fall fruit it is different; we can hold our own with any part of Ontario. Walbridge will keep late into spring and is a profitable apple to grow, but the quality is poor; we hope in time to be able to grow something nearly up to your Spy.

I had a number of winter apples top-grafted, expecting to get something. In fact, I had stuck on everything I could get with the name of winter attached, but unfortunately upon Tolman stock, which proved too tender for the winter of 1903-4. Had I used Longfield, McMahon, or Gideon as stock most would have been safe, as these are proof against sun scald. Just here I may say that I have found by experience that growing a tender top on a hardy stock does not necessarily make that top any hardier; that is, that top will not stand any more frost, or drying wind, in winter than when grown on its own root. It cost me some work and took some years to be convinced, but I am now satisfied that it is so. But, by top working on a stock proof against sun scald, we go a long way in overcoming our greatest difficulty here. We have received an importation from the east that I do not like as yet; they are very few, only half a dozen, and confined to one tree—I mean the Codling Worm. I will watch that tree very particularly, you may be sure. It is now five years since my experimental orchard was started here; 2½ acres was set aside for the work, which was then planted with some stock that I had very little hope for. Now it is a good object lesson; some trees having a circumference of top of 30 feet, such as Wolf River, Princess Louise, etc., while just alongside a little decayed stub, very little bigger than when it came from the nursery, probably Sweet Bough or Blenheim, and that replanted, is to be found. Nature study is good in its place, but as that experimental plot lies just alongside the road, I am tired studying nature just here, and propose to fill up that empty space with something that I know will grow, if for no other reason than to keep up appearances, moving the experimental plot farther back, where I have already made a beginning on a piece of excellent ground.

NOTES BY J. G. MITCHELL, (*Georgian Bay Station*).

In apples I have nothing new to report. What new varieties have been added to our list are not in bearing yet. In the Georgian Bay district Spy,

Baldwin, Mann, Golden Russet, and Ben Davis are strictly winter kinds and the only ones which are stored for long keeping. For early winter R. I. Greening, King, and Snow, if they could be grown clean. Wealthy is taking the place of Snow to some extent here. The most desirable autumn varieties are Gravenstein, Twenty-ounce Pippin, Ribston and Blenheim Pippin.

The above are about the only apples that are asked for in car lots. Ninety per cent. of all the enquiries we get are for Spys in carload lots, which clearly proves the Spy to be not only the most popular but the best apple grown. Only a few days ago we had enquiries for fifty thousand barrels of Spys, while the same people would not buy anything else we had in store. To be sure, we have other good varieties, but the above list is sufficiently large and also the greatest money makers out of some two hundred varieties grown in this section of the country. The Golden Russet, if well grown, is one of the best export apples, but requires strong rich soil.

Of Ben Davis probably there are enough planted for some time, as nine-tenths of all the apple trees planted in the last eight years have been Ben Davis.

BLACKBERRIES.

NOTES BY A. W. PEART, (*Burlington Station*).

The blackberry crop was fair, hardy varieties yielding an average crop, while the more tender gave but few berries. Prices ranged from 7 to 10 cents per quart, according to size and quality of the kind. Young canes made a good growth, and were practically free from any disease. Yield is based on the average per bush or hill of variety.

AGAWAM: Planted 1901; hardy, vigorous and fairly productive; fruit medium size; yield per bush or hill, ¾ quart; season medium.

ANCIENT BRITON: Planted 1901; hardy, vigorous and very productive; fruit medium; season early to medium; yield per bush, 1½ quarts. This is a very promising berry.

DORCHESTER: Planted 1901; a vigorous but tender grower, and poor cropper; fruit large; season early to medium; yield per bush ¼ quart.

EARLY CLUSTER: Planted 1901; vigorous, but tender and unproductive; no fruit; frozen to snow level.

EARLY HARVEST: Planted 1901; medium vigor; tender; no fruit; frozen.

EARLY KING: Planted 1901; moderately vigorous; no fruit; frozen.

ELDORADO: Planted 1901; medium grower, hardy and fairly productive; fruit medium; season medium; yield ½ quart per bush.

ERIE: Planted 1901; fair grower, somewhat tender; season medium; fruit medium to large; yield ½ quart per bush.

GAINOR: Planted 1901; strong grower, but too tender; no fruit; frozen.

HUMBOLDT: Planted 1902; medium grower; no fruit; frozen.

KITTATINNY: Planted 1901; a very strong grower, but a little tender; injured by the winter; season late; fruit large to very large; yield ½ quart per bush.

LOVETT'S BEST: Planted 1901; a stiff, upright but tender grower; fruit medium size; season medium to late; yield ¼ quart per bush.

MAXWELL: Planted 1901; a very spreading, weak grower; too tender; no fruit; frozen.

MINNEWASKI: Planted 1901; strong but tender grower; fruit medium; season early to medium; yield ¼ quart per bush.

OHMER: Planted 1901; a vigorous but tender grower; fruit very large; season medium; yield ⅛ quart per bush.

SNYDER: Planted 1901; strong hardy grower and very productive; fruit medium; season early to medium; yield 1⅛ quarts per bush.

STONE'S HARDY: Planted 1901; strong, hardy grower and fairly productive; fruit small to medium; season medium; yield ⅔ quart per bush.

TAYLOR: Planted 1901; moderate grower, hardy and productive; fruit medium to large; season medium to late; yield ¾ quart per bush.

WACHUSETTS: Planted 1901; fair grower, hardy, but not very productive; fruit medium size; season medium to late; yield ¼ quart per bush.

WESTERN TRIUMPH: Planted 1901; strong, hardy grower, and very productive; fruit medium size; season medium; yield, 1 quart per bush.

WILSON'S EARLY: Planted 1901; a strong, spreading, but tender grower; fruit large; season medium; yield ¼ quart per bush.

WILSON'S JUNIOR: Planted 1901; strong vinelike grower, but too tender; fruit large to very large; season medium; yield ⅛ quart per bush.

NOTES BY G. C. CASTON, (*Simcoe Station*).

AGAWAM and ELDORADO are the two best varieties for this section. Agawam is hardier than Eldorado, and I would give it the preference. This year it did the best. Neither of those varieties suffered the loss of any bearing wood up to the winter of 1903-4. That year, had it not been for the deep snow, there would have been no wood left alive, Eldorado being injured the worst. This variety was injured again last winter, although the lowest temperature was about 24 degrees below zero. Here again the use of nitrogenous fertilizer is certainly wrong, and the use of a manure with a high percentage of potash and phosphoric acid and low in nitrogen is indicated, as having a good deal to do with the ability of plants to stand the effects of excessive cold.

NOTES BY CHAS. YOUNG, (*Algoma Station*).

I cannot report much success with this fruit. I can see now that they were planted in an unfavorable location, and they behaved so badly that perhaps I did not give them the attention they deserved.

This spring I have planted out a new patch on what I think much more suitable ground, a few of each kind, enough to experiment with; twelve varieties in all. Eldorado and Agawam, so far, are apparently the hardiest, but all have been unsatisfactory. I would not recommend any one to plant them in Algoma with any expectation of paying for the trouble. The canes are too stiff to lay down; if they are left standing they are frozen; if topped in the late summer heavy snow strips off the side shoots. I don't want a berry that needs covering in winter. I have twelve varieties under test.

The three new ones received and planted this spring have made a good growth.

CHERRIES.

NOTES BY LINUS WOOLVERTON, SECRETARY FOR ONTARIO FRUIT STATIONS.

Perhaps never was there a more unfavorable season for cherries than that of 1905. Constant rains with variations of cold and heat, developed rot so rapidly that many varieties of sweet cherries were not worth gathering. Tartarians that were in perfect condition apparently, when shipped, were opened out at their destination the following morning a mass of rot. Napoleons that were in perfect condition one day and promised 20 or 30 baskets of magnificent stock to a tree, were the next day worthless and not considered

worth picking. The Dukes were nearly all rotten as soon as ready for picking. Of the black cherries, the one least affected with rot, was Knight's Early Black. The Windsor was worthless near the Mountain, but in the open field it was much freer from rot; orchards that were sprayed, however, were comparatively clean, and no cherry is finer, or more desirable, as a sweet dessert cherry for either home use or market.

The APHIS was not at all troublesome this season, perhaps because of the frequent rains. The following are some brief notes on varieties tested on my grounds:

VARIETIES.

CHOISY is a sweet Duke, delicious flavor. The tree is upright in habit and vigorous. One of the trees is dead, without apparent cause. The crop this season was very light. Season 10th to 15th July.

BLACK EAGLE: Tree vigorous, and grows to a very large size, but is not productive; sweet cherry class. Fruit heart-shaped, large, almost black, and of the very highest quality for dessert. Not profitable. Season, 10th to 15th July.

BLACK TARTARIAN: Tree upright, spreading; vigorous; fairly productive. Fruit large, black, heart-shaped, delicious. Season July 8th to 15th. Unprofitable this season on account of rot.

CLEVELAND: Habit round spreading, fairly upright head; a fairly vigorous grower, yield very small this season. Fruit a white oxheart of very fine quality, if anything superior to Governor Wood.

COE: Tree round spreading; sweet cherry class; very vigorous; yield very good, but not firm enough to ship well. Season July 7th to 14th.

DYEHOUSE: Kentish; round head; fairly vigorous; very productive; yield this season quite as large as Richmond; ready last week in June, and gathered July 5th.

EARLY PURPLE (*Prunus avium*): Sweet Cherry class, and well deserves its botanical name, for it is more eaten by birds than any cherry. The cherry is good if fully matured, but the birds will not allow this, unless protected by nets. It was not profitable; indeed, after counting cost of picking, baskets and sale, it was harvested at a loss. Season, the first ripe cherries were about June 14th, at which time ¼ were rotten, ¼ eaten by birds, and ¼ blasted. Had all remained good, there would have been a very heavy crop. Harvested June 20th.

EARLY RICHMOND: The staple early pie cherry of Ontario. The tree is not quite as vigorous as Montmorency, nor quite as productive. The fruit is smaller than Montmorency, and it ripens earlier. Season last of June. Harvested first week in July this year.

ELKHORN: A vigorous upright, spreading tree, very productive alternate years, and sometimes annually. A Bigarreau that contests the first place for profit with Windsor. The fruit is smaller than Windsor, but in some soils much less liable to rot; black when fully ripe. Season 15th to 20th July. A profitable variety.

ELTON: Upright spreading in habit; productive, but fruit is too soft to ship well, and was not profitable. Season July 5th to 10th.

EMPRESS EUGENIE: Habit upright; class Duke; vigorous and hardy; fruit rather small, and, like May Duke, subject to rot in unfavorable seasons. Not profitable this season.

ENGLISH MORELLO: Tree of roundish habit; inclined to blight this season and cherries to blast; crop small; harvested last of July or beginning of August. Not as profitable this season as Montmorency.

GOVERNOR WOOD: Habit round spreading; very vigorous, trees forty years planted still vigorous and productive; small crop this season; not as profitable as in other years. The best early white oxheart. Harvested June 22nd to 27th, 1905; 63 quarts from a ten-year-old tree.

GRENNER GLAS: Tree of Duke habit, but cherry much like Kentish; upright, vigorous, and productive; cherries grow large in clusters; harvested July 13th.

KNIGHT'S EARLY BLACK: Tree very vigorous, healthy and productive, a forty-year-old tree now thirty feet in height, with proportionate width.

LATE DUKE: A very upright vigorous grower; fruit very large and hangs in great clusters. Harvested July 15th, was most profitable of the Duke cherries this season (1905).

MAY DUKE: Very upright in habit, very vigorous, and very productive; branches slender, brittle; fruit medium in size, excellent for pies because not too acid; fruit rather tender for shipment and ripens unevenly, therefore not a first-class market cherry; deserves a place in every garden for home use. Season June 15th to 30th. Not profitable this season.

MEZEL: Tree upright, spreading, very vigorous and productive; Bigarreau class; fruit on healthy trees very fine, large and showy, reddish black color and very firm. Season last half of July along with Windsor and Elkhorn; does not equal the Windsor when latter is well grown and rot free.

MONTMORENCY: Tree Kentish, round head, willowy, fairly vigorous, hardy, very productive most seasons, but this season half the trees gave a light crop; cherry larger than Richmond. Season July 15th to 20th, 1905; the best pie cherry grown, as well as the one most reliable for profit.

NAPOLEON: Tree Bigarreau, spreading habit, very vigorous, very productive; fruit of immense size, the finest white Bigarreau, in dry seasons the most profitable white cherry; this season not worth harvesting on account of cherry rot.

OHIO BEAUTY: Tree upright, symmetrical, vigorous, very productive, a nine-year-old tree gave 24 quarts worth 7 cents each; cherries large, white, red cheek, very tender, juicy, sweet, delicate, too tender for distant shipment. Season June 25th to July 5th.

OREL 28: Round head, very hardy; succeeds at our St. Lawrence station; productive; fruit rather small. Ripens 10th to 15th July; valuable for cold sections.

PURITY: Tree Kentish, vigorous, very productive, worthy of a visit when it was ready to gather, about tenth of July; cherry of good size, subacid, almost sweet, perhaps the best of its season. Season 1st to 10th of July.

REINE HORTENSE: Tree Duke, upright spreading, vigorous, stout, usually productive, this season a failure, yielding only a few specimens; cherry large, color light and dark red, excellent for dessert or cooking, too soft to be a profitable shipper.

ROCKPORT: Fruit all destroyed with rot.

ROYAL DUKE: Tree Duke class, very upright, fairly productive; fruit not equal to that of Late Duke. Season 1st week in July.

RUSSIAN 207: Tree Morello, vigorous and productive; fruit small to medium; dark red with a long stem and colored juice, quality fair, good for cooking, worth 75 cents an 11-quart basket in 1905, the same as the Kentish Pies. Season July 10th to 20th.

SCHMIDT'S BIGARREAU: An upright-spreading grower, very vigorous, a scanty bearer; fruit very large and fine; one of the best for dessert; a failure this year. Season July 10th to 20th.

WINDSOR: Tree Bigarreau, the most vigorous in the experimental plot, very productive; fruit very large, dark red, becoming almost black, flesh meaty, rich, excellent, but subject to rot. Season July 15th to 25th.

WRAGG: A failure.

YELLOW SPANISH: Tree Bigarreau, spreading, very vigorous, making an immense tree; fruit yellowish white, firm, rich and excellent, but sadly subject to rot; a failure this season; seldom profitable.

VLADIMIR: A failure.

KOSLOV-MORELLO: A failure this season.

Habit of growth and vigor of trees on Maplehurst Fruit Farm. Scale of points from 1 (lowest) to 10 (highest.)

Variety.	Class.	Habit.	Vigor.
Abbesse		Round head	9
Choisy	Duke	Upright, spreading	8
Belle Magnifique	Duke	Round head	6
Black Eagle	Sweet	Upright, spreading	9
Black Tartarian	Sweet	Upright, spreadiug	8
California Advance	Duke	Very upright	8
Cleveland	Sweet Heart	Round, spreading	7
Coe	Sweet	Round, spreading	8
Connecticut Black Heart	Sweet	Spreading	7
Dikeman		Very spreading	7
Kranien Kursch		Upright, spreading	10
Dyehouse	Kentish	Round head	5
Early la Maurie		Upright,	10
Early Purple	Sweet	Upright, spreading	8
Early Richmond	Kentish	Round head	4
Elkhorn	Sweet Bigarreau	Upright, spreading	9
Elton	Sweet Heart	Upright, spreading	9
Empress Eugenie	Duke	Upright, spreading	8
English Morello	Morello	Round head	5
German Ostheim	Morello	Round head	4
Governor Wood	Heart	Round, spreading	9
Grenner Glas		Duke habit, upright	8
Griotte du Nord	Morello	Round head	5
Ida		Upright, spreading	10
King's Amarelle	Kentish	Round, compact	9
Koslov	Morello	Bush	2
Knight	Heart	Round	7
Late Duke	Duke	Very upright,	9
Love Apple		Spreading	6
Lutovka	Morello	Upright	8
May Duke	Duke	Upright	9
Mezel	Bigarreau	Upright, spreading	10
Montmorency	Kentish	Round	6
Mazzard	Sweet	Upright, spreading	10
Napoleon	Bigarreau	Spreading	9
Olivet	Duke	Round	7
Orel	Kentish,	Round, spreading	6
Purity	Kentish	Round, spreading	7
Red May		Upright	7
Reine Hortense	Duke	Upright, spreading	9
Rockport	Bigarreau	Upright, spreading	10
Royal Duke	Duke	Very upright	9
Russian 207	Morello		8
Schmidt's Bigarreau	Bigarreau	Upright, spreading	10
Schatten Amarelle		Round, slender	6
Spate Amorelle		Round head	5
Strauss Weichsel		Round head	7
Suda Hardy	Kentish	Round head	5
Windsor	Bigarreau	Upright, spreading	10
Wragg	Morello	Spreading	5
Yellow Spanish	Bigarreau	Large spreading head	10
Ostheim		Round, slender	5
Vladimir	Morello	Round	3

NOTES BY G. C. CASTON, (*Simcoe Fruit Station*).

I see no reason to make any change in the list given in my last report. The winter of 1903-4 killed several of the most tender kinds, and gave the others a severe trial from which they had not entirely recovered this year so that the crop was so small as to amount to almost a failure. Most of the trees bloomed well and set a large quantity of fruit, but it fell off quite early soon after it was nicely formed. This I attributed to the shock given the trees by the excessive cold of the winter of 1903-4.

Two of the most troublesome pests in connection with cherry growing are the black-knot and the robins. Whether the good done by the latter in the number of insects they destroy compensates for the amount of fruit they devour, is with me still an unsolved problem.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

EARLY PURPLE: Tree vigorous and fairly hardy, but the birds take the whole crop before it is ripe, so I cannot report as to quality or yield. I shall dig out the trees.

EARLY RICHMOND: Tree vigorous and hardy; fruit, medium; color, red; quality, very good, but the birds got nearly all of the crop.

ENGLISH MORELLO: Tree, not so vigorous as some, but hardy and a good bearer; fruit, large; color, dark red or nearly black, colored juice; yield per acre, five baskets; a valuable market variety.

EMPRESS EUGENIE: Tree, vigorous and hardy, belongs to the Duke class; fruit, large; quality, good; will make a good commercial variety.

DOWNER'S LATE: Tree, vigorous and hardy; fruit, large; color, black; flesh, firm; quality, good; a good late variety.

DYEHOUSE: Tree, a good grower, of the Morello class; fruit, ripens earlier than the Richmond; color, red; quality, good, but the birds took the whole crop.

ELKHORN: Trees all killed by frost.

LATE DUKE: Tree vigorous and fairly hardy; fruit, large; color, dark red; quality, good; one of the best of its class for this district.

MONTMORENCY: Tree, vigorous, hardy; fruit, medium to large; color, red; quality, good; flesh, very firm; yield per tree, two baskets.

MEZEL: Tree, vigorous, half hardy; fruit, large; color, black; flesh, very firm; quality, good.

OLIVET: Tree, a good vigorous grower, and hardy; fruit, large; color, red; quality, good, flesh very firm; yield per tree, two baskets.

OSTHEIM: Tree, a moderate grower, hardy, and a regular bearer; fruit, medium; color, nearly black when fully ripe; quality, good; yield per tree, five half baskets.

REINE HORTENSE: Tree, rather tender for this district; fruit, large; quality, good; color, reddish purple.

WRAGG: English Morello under another name.

YELLOW SPANISH: Tree, a good grower, half hardy; fruit, large, color, yellow; quality, good; yield per tree, one basket.

NOTES BY HAROLD JONES, (*St. Lawrence Station*).

My report on cherries for 1905 is rather more encouraging than for any previous year since planting for experimental purposes.

The BIGARREAU and DUKE cherries have both proved unsuitable to this climate, and it is useless to experiment further along this line, but the

Morellos, Kentish and Russian cherries give promise of being hardy and giving fair crops in favorable years.

English Morello: Is fairly hardy, though not entirely so; it comes into bearing at an early age and gives good crops. Some years the fruit buds are partly injured by frost, but 24 below zero does not injure them if the cold is not of too long duration.

Early Richmond has not done well with me, not being planted on suitable soil; on sandy loams it is hardy and prolific, but the birds destroy the crop as fast as the fruit gets color.

Montmorency: Tree hardy and healthy; fruit buds tender and injured most winters. This year I had a fair crop of fine fruit. The tree gives promise of living longer than the English Morello.

Orel: This variety came to me with the label lost, but from the character of the tree and fruit I am satisfied as to the correctness of the name. Tree, hardy and vigorous, heavy bearer, and fruit buds the hardiest of any variety I have planted. Bore a full crop of fruit this year; a good pie cherry.

Ostheim: Tree, vigorous, healthy and hardy, but a very shy bearer, and unless its bearing habits improve as it gets aged it is not worth planting here.

Olivet: Tree, fairly healthy, but fruit buds are killed every year.

Vladimir: A hardy, healthy tree, but shy bearer of small fruit of low quality; of no value.

Notes by W. H. Dempsey, (*Bay of Quinte Station*).

Early Richmond produced a fine crop of fruit which found ready sale at good prices in our local market. It is by far the most profitable cherry for this district.

Montmorency produced a fine crop which, unfortunately, matured in foggy weather and nearly all rotted on the tree.

Notes by Chas. Young, (*Algoma Station*).

This may be disposed of by stating that the sour cherries are profitable here.

Early Richmond, Montmorency and English Morello will fill the season. It is between the two last which is the most profitable to grow. If I were buying the fruit I would prefer by all odds Montmorency. Orel seems to be a good cherry, but I have only one tree to judge by. Morello Fouche is too small, but bears immense crops; a fine preserving cherry. Ostheim has never given me a full crop and the tree is half dead. I have found Montmorency just as hardy as any of the others. It is no use to try to grow sweet cherries here; the tree may live for a few years, but will surely die before it produces any fruit except a few which the birds will claim.

A few Dukes were planted last spring, but the trees were two years too old when taken from the nursery and many are dead.

I have twelve varieties under test, besides some Russians put on as grafts last spring.

CURRANTS.

NOTES BY A. W. PEART, (*Burlington Station*).

Red and White Currants were a good crop, while black gave about three-quarters of an average.

The season was favorable, there being sufficient rainfall and not too warm.

The prices of red currants were from six to eight cents per quart; black ten to twelve cents. All the currants seem to be hardy, and healthy.

BALDWIN: Planted 1903; bush, a moderate grower; fruit, medium size, sub-acid, black; season, medium to late; yield, one-quarter quart per bush.

BELLE DE ST. GILES: Planted 1896; bush, weak grower and unproductive; berry, red, large to very large; season, medium; yield 1½ quarts per bush.

BLACK VICTORIA: Planted 1903; very strong grower; fruit, large, sweet; season, medium; yield per bush, ½ quart.

BOSKOP'S GIANT: Planted 1903; a strong grower; berry, black, large, acid; season, early; yield, ¼ quart per bush.

BRAYLEY: Planted 1896; moderate grower and not very productive; fruit, dark red, medium size; season, medium; yield, 4 quarts per bush.

BEAUTY: Planted 1903; strong grower; fruit, black, sweet, medium size; season, late; yield, 1-3 quart per bush.

CHAMPION: Planted 1896; a moderate and fairly productive grower; berry, black, large, sub-acid; season, late; yield, 3 quarts per bush.

COMET: Planted 1903; fairly strong grower; fruit, red, acid, medium to large; yield, ½ quart per bush; season, medium.

CHERRY: Planted 1896; strong grower and very productive; berry, dark red, medium to large, acid; season, medium; yield 5 quarts per bush.

COLLINS' PROLIFIC: Planted 1898; very strong grower as well as productive; berry, black, large to very large, sub-acid; season, medium to late; yield, 4 quarts per bush.

CRANDALL: Planted 1897; a strong rampant grower, and moderately productive; fruit, bluish-black, large to very large, sub-acid; season, medium to very late; yield, four quarts per bush.

FAY: Planted 1898; moderate grower, fairly productive; berry, large to very large, red, sub-acid; season, medium; yield, 3½ quarts per bush.

LEE: Planted 1896; moderately vigorous and fairly productive; berry, black, large to very large, sub-acid; season, medium; yield, 3 quarts per bush.

NAPLES: Planted 1896; bush, vigorous and productive; berry, black, large, sub-acid; season, medium; yield, 4 quarts per bush.

NEW VICTORIA: Planted 1897; vigorous and productive; fruit, red, small to medium, sub-acid; season, medium; yield, 5 quarts per bush.

NORTH STAR: Planted 1896; strong grower and fairly productive; berry, red, medium to large, acid; season, medium to late; yield, 4 quarts per bush.

PERFECTION: Planted 1903; a moderate grower; fruit, medium to large, acid, red; yield, ½ quart per bush.

POMONA: Planted 1897; a fair grower and moderately productive; fruit, red, medium to large, quality especially good; season, medium; yield, 4 quarts per bush.

PRINCE ALBERT: Planted 1897; a strong productive grower; berry, medium, very acid; season, late; yield, 5 quarts per bush.

RABY CASTLE: Planted 1896; vigorous and productive; fruit, light red, small to medium, acid; season, medium; yield, 5 quarts per bush.

Red Cross; Planted 1896; strong grower; berry, red, medium to large, sub-acid; season, medium; yield, 2 quarts per bush.

Red Dutch: Planted 1897; a moderate grower, productive; berry, red, small, acid; season, early to medium; yield, 3½ quarts per bush.

Red Victoria: Planted 1896; bush, very vigorous and productive; berry, medium to large, acid; season, medium; yield 5 quarts per bush.

Saunders: Planted 1897; strong and productive grower, berry, black, large, sub-acid to sweet; season, medium; yield, 4 quarts per bush.

Standard: Planted 1903; bush, a strong, vigorous grower; berry, black, large, sweet; season, medium; vield, ½ quart per bush.

Success: Planted 1903; moderate grower; fruit, black, large and sweet; season, medium; yield, ¼ quart per bush.

Versailles: Planted 1896; a moderate grower; fruit, red, medium size, acid; season, early to medium; yield, 2½ quarts per bush.

White Grape: Planted 1896; bush, vigorous and productive; fruit, large, white, sub-acid; season, medium to late; yield, 3 quarts per bush.

White Imperial: Planted 1896; moderately vigorous, but not very productive; berry, white, medium to large, sweet and fine in flavor; season, medium; yield, 1½ quarts per bush.

Wilder: Planted 1896; a strong and productive grower; berry, red, medium to large, sub-acid; season, medium; yield, 5 quarts per bush.

Notes by A. E. Sherrington, (*Lake Huron Station*).

Red Currants.

Cherry: Bush, a fair grower, but not as vigorous as some other varieties, hardy and a good bearer; fruit, large; quality, good; yield per bush, 6 lbs., 13 oz.

Fays: Bush, strong and vigorous, hardy; fruit, large; quality, good; yield, 13 lbs., 8 oz.

North Star: Bush, a good grower, but very slender and weak canes, hardy; fruit, small; quality, poor; yield, 2 lbs. 10 oz. per bush. I think this is not the correct North Star.

Pomona: Bush, a fair grower, not as vigorous as it might be, but hardy; fruit, medium to large; quality, of the best; yield per bush, 5 lbs., 10 oz.

Prince Albert: Bush, a strong vigorous grower and hardy; fruit, medium to large; quality, good; yield per bush, 5 lbs., 2 oz.

Red Cross: Bush, vigorous and hardy; fruit, large; quality, good; yield per bush, two years old, 2 lbs.

Raby Castle: Bush, vigorous and very hardy; fruit, small to medium; quality, rather acid; yield per bush, 17 lbs., 10 oz.; a heavy bearer.

Versailles: Bush, strong and vigorous; hardy; fruit, medium to large; quality, good; yield per bush, 5 lbs.

Black Currants.

Champion: Bush, very vigorous and hardy; fruit, large; quality, good; yield per bush, 2 quarts.

Naples: Bush, a strong vigorous grower, and hardy; fruit, large; quality of the best; yield per bush, 3 quarts.

Saunders: Bush, fairly vigorous; hardy; fruit, large; quality, good; yield per bush, 2 quarts.

Victoria: Bush, a fair grower, hardy; fruit, medium to large; yield, none this year.

White Currants.

Imperial: Bush, strong and vigorous, hardy; fruit, medium; quality, good; yield, 4 lbs. per bush.

White Grape: Bush, strong, vigorous and hardy; fruit, medium to large, quality, good; yield per bush, 5 lbs.; the best white currant.

Notes by Chas. Young, (*Algoma Station*).

If there is any one point that we excel in up here in the North it is currants. They never fail to produce a heavy crop, red or black. In twenty years I have never known a failure; give them some care, plenty of manure on the surface, keep down the worm on the red and white and nature will do the rest. I have eight varieties under test and all are good and desirable except the white, which, though perhaps the heaviest cropper among them, yet, on account of its color, meets with poor sale.

The old Red Dutch is perhaps best in quality and Fay's Prolific in productiveness. The chief fault of the latter is its sprawling habit, and it scarcely makes enough of new wood.

Saunders black is good; is of rather a strong growing habit, requires thinning out and cutting severely back.

The local price of red currants is 80 cents per 10 quart basket, and of black $1.00 to $1.25.

GOOSEBERRIES.

Notes by A. E. Sherrington, (*Lake Huron Station*).

Downing: An American variety; bush, strong, vigorous and hardy; fruit, large, color, green, quality, good; yield per bush, 5 quarts.

Pearl: Another of the American varieties; bush resembles Downing in every respect, and no difference can be seen in the fruit; quality, good; yield per bush, four and a half quarts.

Red Jacket: Bush, a strong vigorous grower, hardy; fruit, large; color, red; quality, good; yield per bush, six quarts.

Whitesmith: An English variety; it is perfectly useless, owing to the mildew which destroys all the fruit.

Crown Bob: This is also an English variety, but less subject to the mildew than Whitesmith; still the fruit is unsalable on account of it.

Notes by Chas. Young, (*Algoma Station*).

These have done very well this summer, the fruit was good and clean. The bushes were sprayed once or twice for worms. Among those bearing enough to form an opinion were Pearl and Downing, and decidedly the best as well as the most profitable to grow, two qualities that rarely go together. There is not much difference in the bush of these varieties, but in the basket Pearl is rather larger and evener in size, takes the eye better and perhaps yields a little better; both are good, perfectly hardy and make plenty of young wood to renew. They are thin skinned and can therefore be allowed to get ripe if so desired. They are quite large enough for all practical purposes and of the very best quality. I have grown the English berries for some years, but certainly do not recommend them either for profit or for

quality. The berries do not mildew to any extent here; the leaf sometimes shows a little of it towards the end of a hot summer, especially if the bush is very open, but I fail to see any reason for growing them to the exclusion of the two former. Red Jacket is good enough, but I would only give it a place after the others. I have received three new varieties of English berries this spring for testing and already notice that some of them lack vigor of bush. I recommend Pearl and Downing; the fruit I sold at 10 cents a box, and I could not supply the demand. My bushes were planted five years ago. I have thirteen under test.

GRAPES.

Notes by M. Pettit, (*Wentworth Station*).

Grapes in the experimental vineyard were a very light crop. The wood did not fully ripen and mature the fruit buds owing to the cold wet season of 1904. On many of them the bearing wood was winter killed.

The following is a report on the varieties I have recommended for profit in the Niagara district, in order of ripening:

Champion: A full crop, ripe September 1st; sold at 30 cents per basket net, in hundred basket lots; one of the most profitable as grown at this station on heavy clay with proper thinning.

Delaware: Not a full crop; sample not as good as usual; first picking, Sep. 12th; net price, at that date, 40 cents per basket.

Lindley: A full crop; good sample; first picking, Sept. 13th; net price 28 cents per basket.

Worden: Average crop; first picking, Sept. 14th; price, 20 cents per basket.

Niagara: A heavy crop; fine sample; first picking, Sept. 14th; price, 22 cents per basket.

Concord: Medium crop; good sample; first picking, Sept. 25th; price, 14 cents per basket.

Agawam: Below an average crop; good sample; net price, 20 cents per basket in car lots.

Catawba: Average crop; well ripened; net price, 20 cents per basket in car lots.

I have not included Wilder in the list for profit as previously done; it does not yield quantity enough and it sells for very little, if any, more than Concord.

There are several promising varieties, both new and old; and some of them may in certain localities and soils be as profitable as those mentioned. The following is as short description of some of them:

Aminia: A very large, black Roger, of excellent quality; vine, vigorous and hardy; not quite productive enough.

Brighton: This well known grape is early; good quality; fine appearance; only medium in productiveness.

Campbell's Early: A large, handsome, black grape of fair quality; hardy; productive; early; very promising.

Cambridge: Closely resembles the Concord in growth of vine, foliage and fruit; not as productive.

Dr. Collier: This grape is also of the Concord type, but not as productive.

EARLY VICTOR: A very productive black grape; compact clusters; berry smaller than Concord; ripens earlier; quality not as good.

MOORE'S DIAMOND: Handsome, white; good quality; earlier, but not as productive as Niagara; valuable on account of its earliness.

MOORE'S EARLY: This well known grape should only be planted on deep, rich soil.

MILLS: A fine black grape of good quality, very late; an excellent grape for winter use; requires close pruning or thinning.

REQUA (Rogers 28): Large, compact clusters; berry, dull red or bronze color; good quality; hardy and productive.

WINCHELL: Early, white, of excellent quality; fairly productive; vine lacks vigor.

WYOMING RED: Early; productive; a little larger than Delaware; not as good in quality.

GRAPES FOR WINE: There are many varieties which will produce the finest grades of wine which are not profitable to grow; as they are not prolific enough every year. For instance the DIANA is the best of all for quality: then comes Lindley, Brighton, Creveling, all extra good, but not productive enough on an average. CATAWBA is good and prolific, but does not ripen well enough except on certain soils and localities. I would think well of the following for profitable vine grapes named in order: Concord, Worden, Clinton, and Pearl.

DISEASES: Vineyards were comparatively free from diseases this season; ours were sprayed with the soda Bordeaux twice and some of them three and four times. A very little brown rot and mildew appeared on unsprayed vines.

All varieties ripened well and foliage kept green and healthy until frost on the morning of October 25th.

SPRAYING: One row of cherry, plum and peach trees in the experimental plantation was thoroughly sprayed with lime and sulphur; the other rows with soda Bordeaux before the buds started. The cherry trees on which the lime and sulphur was applied were very slightly affected with aphis as compared with the other rows, and peach trees showed very much healthy foliage where the lime and sulphur was applied. Japan plums and a few peach trees sprayed, after the fruit set, with soda Bordeaux lost most of the foliage and fruit. Apple trees were also badly burned. We shall use lime instead of sal soda in future. Where we applied three pounds of sulphur to full grown Lombard trees, soon after the fruit set and again when half grown, it proved far more effectual than four sprayings with Bordeaux mixture, and is much cheaper.

Bradshaw and Reine Claude have again this season been very profitable, as has also Burbank of the Japan varieties.

FERTILIZERS: We have seen no marked results from the use of stable manure or fertilizers on trees or vines, except in a Baldwin orchard, over twenty years planted. On a row in the centre of the orchard, in the spring of 1902, fifty pounds of Thomas' Fertilizer was applied to one tree and one hundred pounds on the next; two trees were missed, and one bushel of ashes was applied to one tree and two bushels to the next; two trees were again missed, and two hundred and fifty pounds of stable manure applied on the next, and five hundred pounds of manure on the next.

There has been no perceptible difference until this season. When the apples were being picked, there were fully one-third more apples where the manure was applied and the fruit was much larger; the wood growth was

also stronger and the foliage better. The other trees made only a fair average with other parts of the orchard.

NOTES BY CHAS. YOUNG, (*Algoma Station*).

This is another fruit that will never be grown successfully in the north. A hardy, early ripening variety, such as Champion, Janesville, or Moore's Early, can be depended on any year to ripen, but the quality compared with Southern grown grapes, is so poor that there is neither money nor pleasure in them. I have 20 varieties under test, besides three received this spring; they are all growing, none are dead, but I do not care to recommend any of them either for pleasure or profit. The vines will grow and fruit attain full size, color up some and stop at that. I have seldom succeeded in raising a bunch of grapes fit for the table, and have very seldom seen any one who could say they did so. They need not be tried further in this station. I have had the best success in growing in the horizontal form, within ten inches or a foot from the ground.

NOTES BY J. G. MITCHELL, (*Georgian Bay Station*).

The few varieties which we have, have been pretty well described in previous reports, therefore there is very little to add. Without exception this year all our varieties were loaded full, the largest and best we ever had. For several years we have been fruiting such varieties as Niagara, Worden, Brighton, Salem, Concord, Delaware, Green Mountain, Moore's Diamond, Champion, Vergennes, etc.

I think the fact is fairly demonstrated that grapes can successfully be grown here. Every one who has a small garden may have some grapes. They are as easily grown as potatoes. So far we have been free from insects or fungus. All we have to do is to prune and tie them on the trellis and they winter in good condition.

PEACHES.

NOTES BY LINUS WOOLVERTON, SECRETARY FOR ONTARIO FRUIT STATIONS.

The season opened July 26th with,—

SNEED, the earliest of all peaches, small in size and very tender in flesh. By many this peach is condemned as of little value, but having no competitor I am inclined to judge it rather favorably. I shipped a few six quart baskets which sold at 35 cents each. The last were harvested about August 10th.

GREENSBORO closely followed Sneed, being in season from August 10th to August 20th. The trees gave a magnificent yield of about 100 quarts per tree, or about eight baskets each. It is a soft peach, too soft to ship far, but it colors prettily, and does not show bruises as badly as the Rivers. It also ripens through and through, which many of the early peaches do not.

ALEXANDER came in about as early as Greensboro, but in many cases where unthinned was worthless for market. Where well grown and well ripened it was salable at a low price.

RIVERS followed the Alexander, but in most cases was so overloaded that it was small, lacking in color and flavor, and almost unsalable. Where thinned and grown on vigorous trees the fruit was large and fine.

TRIUMPH came in about the 20th of August; but when the trees were unpruned and the fruit not thinned, the latter was scarcely worth gathering. Many of the trees suffered from twig blight and altogether such fruit was unsatisfactory. Where carefully pruned and thinned, however, the fruit was very fine. It is the first yellow fleshed variety, and its color was in its favor among buyers.

HYNES SURPRISE was in season from August 20th to August 30. Though not large, it is a variety of real value in the home garden for it is the best early dessert peach. The yield was good but the trees were not overloaded. Like all early peaches it sold at a low price.

YELLOW ST. JOHN seems to gain in popularity every year; certainly during 1905 it has been remarkably fine. It was large in size, sometimes, where grown on young trees, quite rivalling early Crawford in appearance. This season also it was very highly colored, and packed beautifully in two layers in the seven quart basket. We began harvesting it on the 3rd of September, and were able to secure a few dozen on the 12th of the same month to show at the Fruit Fair in Hamilton.

EARLY CRAWFORD was a great disappointment where not thinned, for the fruit was very small, and had to be sold as second class. The season extended to the 20th of September, about a week later than usual.

FITZGERALD, GOLDEN DROP, GARFIELD, MILLIONAIRE, JACQUES RARERIPE and NEW PROLIFIC are all of the early Crawford type, and of about the same season.

REEVES was exceptionally large in size, highly colored and very beautiful. It is also yellow in flesh, and a fine market peach, but not very productive. It is a trifle later than Early Crawford.

WONDERFUL is another new yellow flesh peach large in size, fairly productive, and a few days later than Early Crawford. I was very favorably impressed with it.

ELBERTA surpassed all records this year. The tree did not show the least indication of Curl Leaf, was most vigorous in growth, and the most productive variety in the orchard. One remarkable thing about the Elberta was that, notwithstanding the immense crop, which broke down many trees, the fruit grew to a large size and took on a superb color. The fruit began ripening about the 20th and was harvested by about the 28th. The worst fault of this peach is its tendency to drop its fruit almost before full maturity.

CHAMPION is the finest white flesh peach, of the season of the Early Crawford, viz., in 1905 between the 10th and 20th of September. The trees loaded tremendously and the fruit was a great favorite for dessert.

THURBER is one of the new peaches which this season has attracted considerable notice. It is a magnificent white flesh peach, of the largest size, firm enough to carry well, but withal of the most delicious melting flesh and of the highest flavor. Its season was from the 20th to the 30th of September.

CROSBY AND KALAMAZOO began ripening about the 25th; both were overloaded, and too small to deserve much notice this season.

WHEATLAND impressed me this season as the best yellow flesh peach in the orchard. It is large, beautiful in appearance, of the highest flavor, making it suitable for either dessert or cooking, a week later than Early Crawford, and the tree is fairly productive. No one who knew the varieties would ever buy Elbertas when he could get Wheatlands.

LONGHURST was as usual not very attractive in appearance, but its good quality for canning still hold for it a leading place with many growers. When allowed to overload the fruit was too small to be marketable.

MATTHEW'S BEAUTY ripened between September 27th and October 5th. It was an attractive looking yellow peach, smooth of skin, and with a fine blush. In form it resembled Elberta so much that it might be called Elberta Late; but in quality it quite surpassed that variety.

WILLETT was harvested the first week in October. It is a large, roundish, yellow-flesh peach, with a red cheek. It is a free stone, of good quality, and a splendid shipper. Then came several varieties to end up the season as for example LEMON CLING, for which we have no longer any place; CARLISLE, which was this season rather small and almost entirely lacking in color and consequently unattractive, although the flesh was a beautiful pure white and excellent in quality. The latter was harvested on the 9th of October.

SMOCK held its place as about the best late peach, giving a splendid yield, but two others of about the same season, viz., between the 10th and 15th of October, closely disputed places with it, viz., GREARY'S HOLDON, and BEER'S SMOCK, both of which are free stone yellow-flesh peaches of about the size and shape of Smock and well worth further trial.

SALWAY is one of the latest good peaches of the season, but does not always ripen in Ontario.

ORR'S SEEDLING was shown me on the 19th of October by the originator, Mr. W. M. Orr of Fruitland. It impressed me as being a peach of great promise. It is large, 2¾ inches in diameter, almost round, yellow fleshed, of excellent quality, a free stone, and superior to any peach of the same season, I have ever seen. It is certainly worthy of careful testing to see if it will ripen in other seasons as well as it has done this season. The peach is a chance seedling on clay ground.

SOPER, BRAY, and STEADLEY are all white flesh peaches of good quality, freestones, which ripened about the 20th of October, (1905), and kept inside in good condition until about November 1st. The largest and the best in quality is the Steadley which measured 2½ inches in diameter. If a peach is wanted so late this seems to be desirable.

KALAMAZOO was almost as late, and a yellow flesh; but this year the trees were overloaded and the fruit very small.

NOTES BY A .W. PEART, (*Burlington Station*).

The following varieties gave fruit, some of them very abundantly:—Alexander, Crawford, Champion, Crosby, Greensboro, Longhurst, Sneed, Steven's Rareripe, Yenshi.

NOTES BY W. W. HILBORN, (*Southwestern Station*).

I have little to report this season as all the peach trees of the experimental plot were destroyed by frost. All the peach orchards on high dry soil in this locality were killed during the winter of 1904. Long continued cold weather froze the ground to a depth of four and five feet. There was no snow during this cold period to prevent the frost from penetrating below the roots. When this occurs it proves fatal to the life of a peach tree.

As per instructions of the Board of Control I planted about five acres to commercial varieties last spring. These have made a good growth and will be protected during the coming winter by a cover crop of Rye and banking up soil around the trunks of the trees.

Varieties planted were mostly of the following, Yellow St. John, Fitzgerald, Garfield, Engle, Mammoth, Edmunds, Reeve's Favorite, New Prolific, Elberta, Gold Drop, Banner, and Wigle.

It is my intention to give special attention to various methods of winter protection of this orchard, with the hope that some practical method can be adopted that will protect the trees and not be beyond the reach of the average grower in cost of application.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

The peach trees that were planted previously to the winter of 1903 where all frozen out. Four varieties have been planted again, and the trees are doing well but have not fruited yet.

NOTES BY W. H. DEMPSEY, (*Bay of Quinte Station*).

BOKHARA: The part of the tree which survived the winter of 1903, bore a fine crop of medium quality.

FITZGERALD, which sustained very little injury beyond the fruit buds, from the severe winter of 1903, bore a medium crop of fine large peaches of good quality.

NOTES BY J. G. MITCHELL, (*Georgian Bay Station*).

Last year we had no peaches, but this year gave us a very nice crop on all the trees which survived the freezing of 1903. Fitzgerald is our favorite. It is much hardier with us than Crawford; bore a fine crop this year, only missed once in four years. Tyhurst also does well having failed only once in six years. Bowslaugh's late had a fine load; failed once in five years. Crosby a good crop to scattering fruit every year and Triumph the same. Champion, Hales Early, Yellow St. John, and Elberta were all killed except one tree, with the cold of 1903.

Let it not be supposed because peaches do fairly well on the Station grounds they will do that all through the Georgian Bay district. The peach belt is only a narrow strip from one to three miles wide along the lake front from Collingwood to Owen Sound.

PEARS.

NOTES BY A. W. PEART, (*Burlington Station*).

In regard to blight of pear trees, I submit the following divisions. The trees have reached bearing age, most of them are nine years old, and are grown on a sandy-gravelly loam in a good state of cultivation. Cultural conditions are the same for all:—

No Blight: Bosc, Boussock, Clairgeau, Giffard, Kieffer, Louise Bonne, Lawrence, Seckel, Sudduth, Tyson, Vermont Beauty, Wilder.

Some Blight: Anjou, Bartlett, Buffum, Duchess (dwarf), Josephine, Marguerite, Winter Nelis.

Badly Blighted: Clapp's Favorite, Easter Beurre, Howell, Lawson, Osband's Summer, *President Drouard, Sheldon.

My experience would lead to the conclusion that pear trees grown on clay or clay loam are less subject to blight than those on lighter soils, and that too much cultivation and manuring, especially on the lighter soils, tend to induce blight through an undue growth of wood.

* Trees all killed.

NOTES BY G. C. CASTON, (*Simcoe Station*).

BARTLETT does very well top worked on Flemish Beauty stock; and I have a block of Clapp's Favorite, not experimental stock, but in my orchard, that is doing very well. Idaho and Anjou in the experimental plot are doing fairly well; and I have several varieties top worked on Russian and Flemish Beauty stock that are not far enough advanced yet to give a definite report; I may have something interesting to report in future about them.

NOTES BY HAROLD JONES, (*St. Lawrence Station*).

Referring to the report of 1904, all the varieties sent me for test are dead or severely injured, except Flemish Beauty, Clapp's Favorite and Ritson; of these three Flemish Beauty is the hardiest and the only one likely to succeed.

Possibly it would be worth while to test a few varieties as dwarfs which I believe will be the only way in which a pear of good quality can be grown in this section.

I may say that I have a pear growing on the farm that has borne annual crops for four generations. It is a first class preserving pear and sells on the local market, where known, in preference to any of the named varieties for canning or preserving. It has been renewed from time to time by transplanting sprouts or suckers.

It is possible that this pear might succeed in other northern sections, where named varieties fail, and it could be distributed by growing the sprouts in nursery row for a year or two until they become established on their own roots.

NOTES BY W. H. DEMPSEY, (*Bay of Quinte Station*).

The pear crop was very light; only a few varieties bore enough to do any thing with. There was very little blight and a marked decrease of Pear Psylla during the past season.

KIEFFER as usual was loaded and the fruit was much larger and finer this year than usual.

GOODALE has only made a moderate growth; it does not seem to be strong; has fruited very sparingly; sells well in our local markets.

LINCOLN made a very good growth, and has fruited well; the fruit is of poor quality; I would not plant it.

Dr. JULES GUYOT is doing remarkably well here; it started to fruit the second year after planting and has fruited every year since. The fruit is similar in form and color to Bartlett; it ripens a week earlier; the quality is good.

SUMMER DOYENNE was planted in 1895. It is a medium grower; productive; the fruit medium in size and ripened in July and August; it does not take well in our market.

WINTER NELIS was planted 1895; made moderate drooping growths; has only bore a few small pears yet; is of no value for this section.

FRED CLAPP was planted 1895; a moderate grower; foliage, dark, handsome; fruited this year for the first; fruit large, fine and of good quality; looks promising.

LOUISE BONNE was planted 1895; made medium growth; fruited this year for the first time; a very good pear.

POUND was planted 1895; a medium grower; this is the first year it fruited; producing a good crop of large, green pears.

SENECA was planted in 1897; the tree is a thrifty, upright grower; fruited two years; fruit large, yellow, with red next the sun; medium quality; season September.

SUPERFINE was planted 1897, and made a moderate growth; tree spreading, blighted once, produced only two good crops; fruit ripened in October; good quality; I would not recommend planting it.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

Thirty-five varieties of pears are now under test at this station, but as only a few have fruited as yet, producing only one or two fruits per tree, I cannot make any report as to quality, or yield. All trees are doing well. I am top working some Kieffer stocks over to other better sorts and I am looking for a great improvement in some varieties by this method.

NOTES BY J. G. MITCHELL, (*Georgian Bay Station*).

This season Anjou produced the largest and finest crop we ever had, exceptionally clean and smooth. Some of the trees were bent to the ground. They seem to be doing better as they grow older. Duchess gave rather a lighter crop than usual, but the fruit was very large, clean and smooth, and the best in quality we ever had. Bartlett is still the most profitable early pear here. They generally yield a good crop, ripening just after the Niagara district pears are done; and this, together with their fine quality, makes them always command a ready sale.

Such varieties as Howell, Louise, Beurre Clairgeau, Clapp's Favorite, Goodale, are all doing very well. In fact, we have not any failures to report in pears. Bartlett Seckel fruited both last year and this, a very few fine pears. I am very much impressed with them. They are very strong, healthy growers, and most promising in every way. None of the recent French importations have yet borne fruit, and some are, so far, not very promising; they are very slow growers, while others are doing very nicely. They are living, however, and a few blossoms showed on some of them last spring, and we hope to get some samples next year.

NOTES BY CHAS. YOUNG, (*Algoma Station*).

The winter of 1903-4 was so destructive on this fruit that I may say I have to begin at the beginning again. Seventy-five per cent. of the trees, such as they are, are left; some growing from a stump, others with half the top gone, but all more or less injured. Among the nine varieties tested Kieffer is gone, root and branch; this was the earliest to come into bearing, but the quality was so poor I do not want any more of it. Anjou, not supposed to be a hardy variety, has come through better than even Flemish Beauty. None, except Kieffer, were killed to the ground. Bessemianka suffered least, and bore fruit this year, small and poor in quality. The winter of 1903-4 was the hardest ever known in Algoma, and, although I cannot say that pears before that were successfully grown in the district, still, to some extent, they could be. Unless we can get something as hardy as Bessemianka, and of a better quality, the general public will have to depend for a supply upon growers further south.

At the present I would not recommend any for planting, although some of the Russians might be experimented with. I have several on old stocks for test, and hope to report more favorably later on when they come into bearing. All were planted in the spring of 1900.

I would most distinctly affirm that all trees, apples and pears, planted in the north, should be headed low. Pears, especially, as near a bush form as possible. If the lower limbs are on the ground, all the better.

PLUMS.

Report on Vigor and Habit, by L. Woolverton, Secretary for Fruit Stations.

Scale in points from 1 (lowest) to 10 (highest).

Varieties.	Habit.	Vigor.
Abundance	Upright, spreading	8
Arch Duke	Upright	8
Arctic	Round	6
Baker German Prune	Upright	7
Belle de Septembre	Upright	5
Burbank	Spreading, sprawling	5
Chabot	Upright, spreading	10
Czar	Upright	5
Dunlop	Upright, spreading	5
Fellemberg	Round	5
German Prune	Round	5
Golden Cherry	Round, willowy	10
Goliath	Spreading	6
Gueii	Upright	8
Hale	Round, spreading	10
Hand	Round	8
Huling	Round	6
Ickworth	Round	7
Imperial Gage	Round	8
Jefferson	Upright, spreading	10
Kingston	Upright, spreading	8
Lady Jane	Spreading	8
Lafayette	Round	6
Lincoln	Round	5
Luscombe	Spreading	7
McLaughlin	Round	5
Orleans	Round	8
Oullin	Upright	8
Peter's Yellow Gage	Spreading	8
Prince d'Agen	Round	5
Prince Engelbert	Upright	7
Purple Egg	Upright	10
Quackenboss	Upright	10
Red June	Upright, spreading	9
Reine Claude	Round	5
Saunders	Round	5
Shropshire	Very upright	8
Sophia	Round, willowy	10
Spaulding	Upright, spreading	8
Tatge	Upright, spreading	5
Transparent	Round	5
Victoria	Round, spreading	7
Washington	Upright, spreading	8
Wild Goose	Spreading	10
Willard	Spreading	9
Yellow Gage	Round	8
Younker's Golden	Round, spreading, willowy	10
York State Prune	Round	8

NOTES BY J. G. MITCHELL, (*Georgian Bay Station*).

EUROPEAN PLUMS. A great number of varieties of these plums have been tested here. After an extensive trial, and under quite equal conditions for all, the old well-known and well-tried varieties still carry the palm. Unlike the Japans, many of these plums are from fairly good to excellent quality. But I would, after long experience with large plum orchards, advise the planting of few varieties. Plum growers would find very much less trouble and, also, more profit with just a few varieties, sufficient to cover the season, and they the very best.

Climate and other conditions are so different in places a short distance apart that I don't like to advise except in a general way. The following list should give excellent satisfaction, and are what I would plant for myself. to cover the season: (1), Red June; (2), Washington, where it will do as well as it does here; (3), Bradshaw; (4), A few Lombards, Quackenboss (or Glass Seedling); (5), Prince D'Agen, which is a good bearer, and almost as good a plum as German Prune, usually a very poor bearer. I would include also Arch Duke, Yellow Egg, Pond Seedling, Coe's Golden Drop, and Reine Claude. To this might be added Monarch, as the plums are splendid shippers, but the trees are very short-lived with us.

CULTIVATION, PRUNING AND CARE. Let me say right here, there is no fruit which responds to good cultivation, fertility and care better than the plum, and there is none, I think, which more quickly show neglect. Therefore, it is expedient they should never be neglected. Cultivation in the early season is to conserve moisture. They need lots of water fertilizer to promote growth and fruit. We might just as well try to raise a prize calf on starvation rations as to grow plums without fertility.

A word about pruning. It has been generally supposed that plums require very little pruning. Experience has taught me such is not the case. They require very careful pruning, all dead or decaying wood should be cut out and burned every year. All long, slender shoots should be cut back to a foot or so long, and, finally, the whole top thinned to admit free circulation of air and sunshine to all parts of the tree.

SPRAYING. I find it a paying operation to spray once just before the buds begin to burst; again, when young plums are just formed, and again in about eight or ten days, as to weather.

If all the above conditions are faithfully carried out it is almost certain that there will be a crop of very good plums. It should be needless to say the spray should be the standard Bordeaux mixture, with Paris green added.

JAPAN PLUMS. Although strong growers, quite hardy, good bearers, and many of them of the most attractive appearance, yet their quality is so much against them that they are fast becoming unpopular. In my opinion, and, also, in the opinion of many more fruit growers, nothing else has so much tended to make plum-growing unprofitable as the introduction of the Japan plums. Very few people who ever bought a basket of Japan plums will ever want a second one, and I, myself, would not use the best basket of Japan plums I ever saw if I could at all get one of any of the well-known European varieties.

The canning factories, at least all those I have interviewed, do not want them. They say that the Japan plums make a very poor class of goods. Even here, where several lake traders call, and large quantities of plums are shipped north, they are hard to sell; in fact, they cannot be, only at a low price, which reflects very much against the plums of better quality.

Therefore, I could not recommend the planting of Japan plums at all, unless it would be the Red June, and then in quite limited numbers. They are more like the European, and the first to ripen. In addition to that, Chabot, Burbank, and Satsuma are the best, as far as tested here.

NATIVE PLUMS. After a thorough test of several years, and under exceptionally favorable conditions, all the native or American plums I have for profit, as compared with the European varieties, have proved themselves to be most signal failures. Out of all the large list which we had in test there is not one single variety I could recommend, but must condemn them all as not worthy of a place in any orchard in the best fruit sections of Ontario.

NOTES BY HAROLD JONES, (*St. Lawrence Station*).

The plum trees that survived the freeze of 1903-4 came through the past winter in fairly healthy condition. All the new wood made during the summer of 1904 came through uninjured, and the fruit buds wintered well. The following varieties fruited:

BURBANK: Two trees planted 1899; a few fruits ripened in 1900; buds injured in 1901, 1902 and 1903; one tree injured, and one killed in 1904; in 1905 the living tree bore a crop of fruit, about 18 qts.; some injury from plum rot at picking time.

GUEII: Planted 1896; trees hardy and vigorous; fruit buds partly injured most winters, but this year the trees bore a full crop, part of which was injured by plum rot at picking time.

GOLD: Planted 1898; one tree survived the freeze of 1903, and produced a crop of one plum this year; tree is not in a healthy condition.

GLASS SEEDLING is proving a hardy, healthy tree, but does not bear any fruit; a few blossoms this spring, but no fruit on trees planted in 1897.

LOMBARD gave a fair to full crop of fruit, and was much freer from plum rot than Gueii or Burbank.

MARU, OGON and RED JUNE continue healthy, but do not set fruit, although they had a good bloom this spring.

COL. WILDER, WHITAKER and HAMMER had light crops.

WOLF, WYANT and DESOTO suffer severely from attacks of aphis from year to year, which ruins the crop, if not controlled early in the season. In any event, these plums are of no commercial value, and are not worth growing, except for home use where Europeans or Japans do not succeed.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

ABUNDANCE: Tree, vigorous and hardy; fruit, large; color, reddish purple; quality, good; yield per tree, five and a half baskets; ripe, August 19th.

BURBANK: Tree, spreading, vigorous, healthy and hardy; fruit, large, if thinned, or not allowed to overbear; color, red; quality, good for canning; yield per tree, 12 baskets; one of the best of the Japanese varieties.

BRADSHAW: Tree, upright to spreading, vigorous and hardy; fruit, large; color, purple; quality of the best; yield, 5 baskets per tree; a very profitable plum.

COE'S GOLDEN DROP: Tree, strong, vigorous and hardy; fruit, large; color, yellow or light green; quality, medium; a late variety; yield per tree, 5 baskets.

FIELD: Tree a vigorous upright grower, hardy, does not come into bearing as early as some other sorts; fruit, medium to large; color, purple; quality, very good; yield, four and a half baskets.

GUEII: Tree, vigorous and hardy; fruit, large; color, purple; quality, good; yield per tree, 12 baskets; one of the best of the European varieties.

GOLD: Tree a slow grower, but hardy; fruit, medium; color, yellow; quality, poor; yield per tree, two quarts; worthless.

HUGHES' SEEDLING: Tree an upright grower, vigorous and hardy; fruit, medium to large, resembles yellow egg, but quality not so good; yield per tree, three and a half baskets.

IMPROVED LOMBARD: Tree resembles the old Lombard; fruit, about the same as the old variety; yield per tree, four baskets.

IMPERIAL GAGE: Tree vigorous and fairly hardy; fruit, medium sized color, yellow; quality, rich and good; yield per tree, 8 baskets.

LOMBARD: Tree vigorous and fairly hardy; fruit, medium to large; color, purple; quality, good; yield per tree, four baskets.

MONARCH: Tree vigorous and fairly hardy; fruit, large; color, purple, with heavy bloom; quality, good, first-class for shipping; yield per tree, five and a half baskets.

OGON: Tree vigorous, hardy, and early bearer; fruit, large; color, yellow; quality, good; yield per tree, one basket, two years old.

PRINCE ENGLEBERT: Tree an upright grower, fairly hardy; fruit, medium to large; color, purple; yield per tree, five and a half baskets.

POND'S SEEDLING: Tree an upright grower, vigorous and hardy; fruit, very large; color, red; quality, rather coarse; yield per tree, four and a half baskets.

QUACKENBOSS: Tree spreading, vigorous and hardy; fruit, very large; color, purple; quality, very good, must be left on the tree until fully ripe; yield per tree, seven baskets.

RED JUNE: Tree is a strong and vigorous grower, hardy and productive; fruit, large; quality, good, valuable owing to its earliness; yield per tree, three baskets.

SHIPPERS' PRIDE: Tree upright, strong and vigorous grower; fruit, large; color, purple; quality, good, very firm, making it a good shipper; yield per tree, six baskets.

SPAULDING: Tree vigorous, spreading and hardy; fruit, medium; color, yellow or green; quality, good; yield per tree, ten and a half baskets.

VICTORIA: Tree moderately vigorous, hardy, and a persistent bearer; fruit, large; color, mottled; quality, good, this is the favorite in England and Scotland; yield per tree, seven and a half baskets.

YELLOW EGG: Tree vigorous, spreading and hardy; fruit, large; color, yellow; quality, good, but a little coarse; yield per tree, three baskets.

NOTES BY A. W. PEART, (*Burlington Station*).

NEWER VARIETIES. AMERICAN: Planted 1901; tree upright, spreading, hardy, moderately vigorous; fruit, medium to large, oblong, light yellow, mantled with crimson, and very handsome; season, early September; quality only fair; yield per tree, two quarts.

BLOOD No. 4: Planted 1898; tree and fruit resemble very closely the Satsuma, the flesh being red to the stone; yield, two eleven-quart baskets per tree.

NORMAND: Planted 1898; tree a spreading, hardy, moderate grower; fruit, large, round, yellow, firm and meaty; with a distinct nutty flavor like that of a well-matured Ogon; quality, excellent; season, last of August; yield, one eleven-quart basket per tree.

There was a medium crop of plums this year, although the rot was very bad in some varieties, and curculio bad, causing considerable loss in the early part of the season.

America: Planted in 1900; tree made slow growth, bore six small, red plums this season.

Burbank: As usual, bore a heavy crop of fine plums that sold well in our local market at $2.00 per bushel. Trees planted in 1896 produced 2½ bushels.

Abundance: Planted in 1896; tree is not very hardy, freezing back more or less each year; has produced but very little fruit yet.

Orange Prune: Planted 1895; tree made good growth; has yielded but little fruit, and of very poor quality.

Chabot: Planted in 1897; made rapid growth; productive, maturing in August.

Notes by G. C. Caston, (*Simcoe Station*).

Of over 20 varieties of plums of the European class tested here one stands out prominent as thoroughly hardy. That one is the Staunton. It is now quite a large tree, and came through the severe winter of two years ago unharmed, and bore a nice crop this year. Of the Japans the Burbank is about the only one surviving. These fruited well this year. I have some of the Americana class, but they are not worth growing.

Notes by Chas. Young, (*Algoma Station*).

All plums, except the Americana class, suffered more or less on account of the winter of 1903-4. The percentage of loss does not fix the degree of hardiness by any means, for I notice that trees which carried a heavy crop in 1903 suffered most in the following winter. I am losing my preference for the Japans as a whole somewhat. They are not strictly an honest fruit, that is, to put it in plain English, they look better than they taste. Of course they are not all poor in quality; Burbank is a good plum, and one of the most desirable in this class; it requires severe cutting back to form a closer top. Taking quality into consideration, this is for this section perhaps the most desirable in this class. Red June may be better, but is more tender, and absolute hardiness should be the first consideration here. Ogon came through that severe winter better than any of this class; it is a handsome fruit, but not first rate in quality; it bore a small crop this year. Gold fruited for the first time; it is fairly hardy, and better in quality than some of the others. Wickson is too tender, I have replanted it twice, and lost all. Willard is only worth growing as an ornamental; it is completely covered with blossom in the spring, but not one in a thousand sets fruit; the quality is very poor; the tree is moderately hardy. America kills back on the south side of the top every winter. Smith's October had a few fruits for the first time this year.

The Europeans, as a class, are not quite so hardy as the Japans, but the quality is better. Reine Claude I have lost completely. It was planted on low, wet ground, and this may have been the reason. Glass Seedling and Lombard have suffered least, and bore some fruit this year. They have recovered better than any of the others. This last is inclined to overbear some years. No curculio has made its appearance here yet, nor has black knot affected any of the European plums.

I was badly disappointed with the Americana plums before they began to bear fruit; it was very annoying to see a fine, big top half broken off;

but they soon recovered, and are absolutely hardy, and in just such a season as 1905, when we have few plums, we can estimate their value. I have Hawkeve, Wolf, Stoddard, and De Soto. All are desirable in this section. They are poor plums to eat out of hand, tough, thick skins, but excellent for preserving. I would like to have them ripen two weeks earlier. This is a most desirable class of fruit for the North, especially for those who do not make a specialty of fruit growing. This class should be further tested, and, if possible, some variety a little earlier, and with less of the appearance of the wild plums, could be had, and of as good a preserving quality as De Soto; then as near perfection as we can reasonably look for in this fruit would be attained.

I have 22 varieties under test, mostly Europeans.

RASPBERRIES.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

BRANDYWINE: A poor grower, canes small and weak, lacks vigor; fruit, small, half quality, rather poor and soft; color, bright red; ripe July 11, last picking July 22; yield, 12 pounds per 20 feet of row.

CUTHBERT: A very strong and vigorous grower, canes strong, healthy and hardy enough to make it a very profitable variety; size of fruit, 11/16 of an inch; color, dark red; firm, and quality of the best; ripe July 19, last picking August 14; yield per 20 feet of row, 21 pounds 11 ounces.

CAROLINE: Plant, strong, vigorous and hardy; fruit, small, quality very poor; color, white; ripe July 17; yield per 20 feet of row, 9 pounds 14 ounces. Poor.

GOLDEN QUEEN: Canes strong, vigorous and hardy; size of fruit, 5/8 of an inch; color, white; quality, good; ripe July 15, last picking August 14; yield per 20 feet of row, 14 pounds 2 ounces.

HERBERT: Plant, strong, vigorous and very hardy; size of fruit, ¾ inch; color, bright red; quality, good; ripe July 17, last picking August 11; yield per 20 feet of row, 35 pounds 5 ounces.

HARRIS: Canes very small, only about 18 inches high; size of fruit, ¾ inch; color, red; quality, good; ripe July 13, last picking August 11; yield 18 pounds.

MARLBORO: Canes strong, of dwarfish habit, healthy and hardy; size of fruit, ¾ inch, firm and fair quality; color, bright red; ripe July 13, last picking August 11; yield per 20 feet of row, 20 pounds 10 ounces.

MILLER: Canes fairly vigorous, healthy and hardy; size of fruit, 5/8 inch; color, red; quality, fair; ripe July 11, last picking August 7; yield per 20 feet of row, 16 pounds 7 ounces.

PHOENIX: Plant fairly vigorous and hardy; size of fruit, 5/8 inch; color, dark red; quality, good, firm; ripe July 15, last picking August 14; yield per 20 feet of row, 24 pounds.

RELIANCE: Plants fairly vigorous and hardy; size of fruit, small, ½ inch; quality, good, but soft; ripe July 11, last picking August 3; yield per 20 feet of row, 15 pounds 6 ounces.

THOMPSON: Plants small and weak, a poor grower; size of fruit, ½ inch; soft, and quality only fair; ripe July 11, last picking August 7; yield 7 pounds.

TURNER: Plants fairly vigorous and very hardy; size of fruit, small, ½ inch; color, dark red, soft, but quality good; ripe July 11, last picking August 7; yield per 20 feet of row, 15 pounds 11 ounces.

NOTES BY G. C. CASTON, (*Simcoe Station*).

Cuthbert is still the leading market berry, and will continue so until something better turns up. Although it kills back a little in the tips, yet there is nothing among a good many varieties tested to supersede it. This was decidedly a raspberry year, and the crop was one of the best ever harvested. I have found it the best plan in pruning, especially old plantations, to allow the canes to grow during summer and not stop or pinch them; and in the spring to cut back to the sound wood, thus cutting out the frozen tips as far back or a little farther than they are injured by the winter. I have found this plan to give better results than the former plan of pinching back in summer. I have quit growing Black Caps and the purple crosses. They were not in demand, and do not pay.

STRAWBERRIES.

NOTES BY E. B. STEVENSON, (*Strawberry Station*).

The strawberry season in this section was nearly two weeks later than usual. Snow covered the ground until the middle of March, which was fine the whole month. Snow had all disappeared by the last week, then followed some very warm weather. The temperature one day was 76° in the shade, and other days were quite warm the last week in March. April came in bright and fair, changed the second week to cold and high winds; on the 14th very cold and snow; on 15th rain and flurries of snow; 16th cold and snowy; 17th to 21st cold and snow, with very hard frost at night; rain the night of 20th turned to snow; snow covered the ground all the 21st.

May was very cold, frosty nights. The consequence was that strawberries were late in blooming; all the first blossoms were frozen. June came in wet and cold at night, with frosts from 3rd to 8th, and wet all the time. The sun was hardly seen during that period, this sort of treatment by the sun was very hard on the strawberry blossoms. The crop was short, all the first ones having succumbed to the late frosts; still we had a fair crop of the medium and late varieties. This has been a season in which the medium and late varieties have been more profitable than the early and extra early sorts.

The first picking of Van Deman was on June 20th. We also picked the first of Johnson's Early and Lord Sheffield on that date. Howard's 103 and Early Hathaway we picked June 22nd, and Annie Hubach was first picked June 24th.

The old standards such as Tennessee, Prolific, and Haverland, Glen Mary, Splendid, Clyde, Williams, Sample, Senator Dunlap, Brandywine, all did well. Tennessee Prolific and Sample and Haverland were about the best of the old varieties. Parson's Beauty did very well this season. These old varieties have been so often described, and are so well known, that it will not be necessary for me to burden my report with such description, but will use my allotted space in placing before you the newer and less known kinds that fruited with me the past season. I will give them in alphabetical order; but, before doing so, I would just like to single out one or two of the new kinds for special mention, such as the "Cardinal," "Wonder," and "Howard's No. 103."

The CARDINAL, I believe, will take a first place as a market berry when it is well enough known. The first plants of it were sent me two years ago by the originator, Geo. J. Streator, of Ohio. He made great claims for it. I would first say that it has proved to be all that he said it was, and I hear of it doing as well in other places, viz., A. W. Clarke, of Rhode Island, says with him, "It is all that the originator claimed for it; it is a wonderful berry."

I will now endeavour to give a description of the new and largely unknown varieties which I have fruited this season.

ANNIE HUBACH (Perfect): Originated and sent out by Hubach and Hathaway, of Arkansas. Plant healthy, stools out, each plant has a half dozen fruit stalks, loaded with fruit; berry long, conical; seeds somewhat imbedded; good scarlet color; firm and tartish; very productive and early; medium in size.

ARKANSAS BLACK (Perfect): From the same firm as above; plant large, healthy, dark, stools out, only medium in productiveness; berry very roundish, dark scarlet, medium to small in size, of poor quality, not desirable.

ALICE HATHAWAY (Perfect): From the same firm. Plant healthy, a good runner, and productive; the berry medium to small, roundish conical, scarlet, and good quality, worth trying.

AUTO (Perfect): Sent out from Maryland. Plant is strong and healthy, a fair grower; the berry is large, somewhat irregular, resembles Glen Mary.

AUGUST LUTHER (Perfect): is a good early, and does well in many places; a failure in others.

AROMA (Perfect): A strong, healthy plant, one of the best late varieties, a good pollenizer for late pistillates; it ripens a little earlier than Gandy, but continues later; the berry is large and fine; a good late.

ARMSTRONG (Perfect): This is almost identical with New York Corsican, Uncle Jim, and Maximus, and others. I can see no difference between them. The plant is large and healthy, a good grower; the berry is large, the flavor is good; somewhat irregular; medium only in productiveness.

BEN DAVIS (Perfect): The plant is healthy, a good runner, and very productive; the berry is roundish conical, somewhat irregular, scarlet with yellow seeds, medium to large in size, medium firm, of fair quality; worthy of a trial.

BEAVER (Perfect): This was sent me by Mr. Crawford, of Ohio. It has been a disappointment. The plant is small, hugs the ground, shows considerable rust; it makes runners freely, is fairly productive of small, roundish berries; is quite firm, white inside, of good quality. I will give it further trial.

BUSTER (Imperfect): Sent out some years ago by C. C. Stone. The plant is a strong, healthy grower, making runners freely; the berry is large, roundish, bright red, medium in firmness, quality fair, but acid; medium to quite late; it is well worthy of a trial by growers.

BUBACH (Imperfect): BRANDYWINE, (Perfect): BISMARCK, (Perfect): BEDER WOOD, (Perfect): All did well; are so well known and grown that it is not necessary to describe them more than to say they maintain their position held for so long; it is hard to beat them.

CLYDE (Perfect): One of the best known and most grown; with me it it is weakening in plant vigor; it did well the past season; fruit large and good quantity.

Commonwealth (Perfect): Originated with Wm. H. Monroe of Massachusetts. Plant is large, healthy, a good grower, shows no rust; medium in productiveness; berry is large, conical like Woolverton, resembles it very much in shape and appearance also in taste; I should call it a second Woolverton. It is claimed for it that it will be the "great coming berry." Well perhaps, but it must do better than it did for me the past season.

Cardinal (Imperfect): Originated by Geo. J. Streator, of Ohio. The plant is very large and healthy, no rust has yet appeared on it, the foliage is bright green, it makes lots of runners that root freely; in fact it has made the widest row of any in my trial plot this season, the fruit stalks are strong and tall, and hold the fruit well up from the ground; the berry is large, not as large perhaps as Clyde or Bubach but large; the plant is very productive; berry of good color, attractive and of good flavor, a little acid, firm enough to ship a good distance; the reports from other places, where it has been grown the past season, are all favorable, some of the reports are very favorable. At the Rhode Island Exhibition for 1905 it obtained 1st prize for "best new variety" and a "certificate of merit." I believe it will prove to be a good market berry.

Corsican (Perfect): See "Armstrong."

Climax (Perfect): Originated by C. Graham of Maryland from seed of Bubach. The plant is strong and healthy; berry is roundish, large scarlet, early, and quite productive; it is worth of a trial.

Challenge (Perfect): The plant has proved so weak with me that it has been a complete failure here.

Early Hathaway (Perfect): Originated by Hubach and Hathaway of Arkansas. Plant a good runner, healthy; berry conical, firm, red all through, acid of good quality, medium to large; very productive; a good early, well worthy of a trial.

Early Market (Perfect): From Hubach and Hathaway. Plant healthy, good grower, makes plenty of runners, quite productive; berry scarlet, roundish, worthy of a trial.

Early Beauty (Perfect): Plant a good grower, small, some rust, medium in productiveness; the fruit roundish, medium to small, good red but sour; very like to Excelsior.

Emperor and Empress (Perfect): Originated by the late J. Little, of Granton, Ontario, both have same origin; very like each other; plant a strong, healthy grower; medium in productiveness; very like the old Jessie; berry large of good quality.

Fairfield (Perfect): Plant good grower, quite productive, did well with me, seems to be a good early kind; berry is above medium size, somewhat irregular, promises well as an early.

Fremont Williams (Perfect): From Hubach and Hathaway. Plant large and healthy, a good runner, productive, medium to late; berry large, double at nose, of good quality, worthy of a trial.

Floretta (Perfect): Seedling of Bubach by Dr. Brown, Ia. Plant strong and heathy, a good grower and plant maker, productive; berry large, some of them double, a good bright scarlet, quality good, fine for eating out of hand; worthy of a trial.

Ford (Perfect): From Arkansas. Plant a good runner; berry round, scarlet, medium size, of good quality; fairly productive.

General De Wet (Imperfect): Introduced by L. C. Keoitt of N. J. Seedling of Bubach and Parker Early; plant like Bubach; berry large, somewhat soft, good color; not very productive.

Great Washington (Perfect): The plant is a fair grower with some rust, makes plenty of runners; the berry conical, scarlet, firm, of good quality and productive.

Glen Mary (Perfect): and Gandy, (Perfect): Both old standards, well known, did well with me.

Granville (Perfect): Plant very healthy, a strong and vigorous grower, supposed seedling of Minet's Prolific; berry large, roundish oblong, dark glossy red, seeds red, flesh solid and white inside, very good flavor; season medium to late.

Greenville (Imperfect): A second Bubach, did very well this year.

Howard (Perfect): From J. H. Black, N. J. Seedling of Barton's Eclipse and Gandy; the plant is strong, and healthy and productive, season late as Gandy; good color and firm; worth a trial.

Howard's No. 2 (Imperfect): Originated by late G. W. Howard of Michigan. Plant small, some rust, fairly vigorous; fruit roundish like Splendid; mild flavor, medium in productiveness, scarlet color, medium in size, will give further trial.

Howard's 96 (Perfect): By late G. W. Howard of Michigan. Plant healthy and strong, a good grower; berry is roundish conical, scarlet in color; medium firm, good quality, and fairly productive.

Ham (Perfect): Originated by J. H. Black of N. J. Plant a vigorous grower; very dark foliage, fairly productive of large berries; berry dark in color, smooth and firm, flesh deep red, good quality; worthy of a trial.

Howard's 103 (Imperfect): Originated by A. B. Howard of Massachusetts, not yet introduced, sent to me for trial. The plant is a good grower makes runners freely, very productive; berry is large, conical, dark scarlet, firm and good flavor, solid and white inside, seeds yellow, a good looking berry; ripe two days after Van Deman, a good market berry.

Howard's No. 7: Originated by A. B. Howard of Massachusetts, not yet introduced, did well with me this season; plant healthy, a good runner; berry conical, quite productive, very good quality.

Heflin's Early: Plant healthy, small medium grower; berry small, roundish, only medium in productiveness; another trial.

Haverland (Imperfect): Maintains its place at the front; it did well this season.

Irene (Imperfect): Did well this season, a good one.

Joe (Perfect): From J. H. Black, N. J. The plant is vigorous, foliage clean, and healthy, productive; the berry is large, bright red, obtuse conical and uniform in size, quality, good; season medium to late; a good one.

Kansas (Perfect): Plant a good grower, makes plants freely, healthy, medium in productiveness; berry good scarlet, firm and good flavor.

Kitty Rice (Imperfect): Plant a good grower, claimed to be a good market variety; it has only succeeded moderately with me.

Lyon (Imperfect): A good mid-season sort; berry dark glossy red, red seeds, flesh red, medium in firmness, flavor good, spicy, large, resembles Longfield; berry quite productive.

Latest (Imperfect): Plant is healthy, vigorous stools out; berry is large, conical, blunt at end, color good crimson, flesh red, medium firm, quality good; quite late; worth trial.

Louis Hubach (Imperfect): Sent out by Hubach and Hathaway. Plant small, fair runner, berry roundish flat, medium productiveness, medium quality, not much good.

Lucas (Perfect): Plant healthy, a good runner, and productive; berry, roundish conical, dark scarlet, medium firm, fair quality, medium in size, will give another trial.

Lester Lovett (Imperfect): Gandy under a new name.

Monitor (Perfect): A good early plant, good grower, healthy; berry large, round, medium firm, bright scarlet, worthy of trial for near markets.

Mrs. Fisher (Imperfect): Seedling of Hubach, and Sharpless by J. H. Black; plant good healthy grower; berry very large, late bright scarlet, medium firm, good quality, valuable for near market.

Mrs. Mark Hanna: Plant is large, some rust; berry large on vine; not desirable on acount of its rusting.

Mark Hanna (Imperfect) : Sent me by M. L. Thompson, of Virginia; a strong robust grower, and productive of large berries; good color; worthy of a trial.

Mrs. Miller (Imperfect: Plant is large and healthy, productive; berry medium to large, bright, long, good quality; worthy of a trial.

Morning Star: Did not do well; another trial.

Minute Man (Imperfect): Plant a good grower and productive; berry medium in size, regular conical, good red in color; not firm enough.

Margaret (Perfect): On rich ground this is one of the best; plant healthy; berry large, mostly conical, sometimes long, dark glossy red, and good quality; late season.

Marie (Imperfect): Seedling of Crescent plant; is healthy, a good grower; berry large, roundish, somewhat irregular, scarlet yellow seeds, medium firm, flesh pink somewhat sour but spicy; a good one.

New York (Perfect): See Armstrong, etc.

Oom Paul (Perfect): Plant large and healthy, a fair runner, medium productiveness; berry is large, somewhat irregular, dark red; did fairly well.

Olive's Pride (Perfect): Plant healthy medium in size, a good grower, very productive; berry resembles old Crescent in size and shape, of fair quality; season medium early; worth a trial for market.

Oscar's Early (Perfect): From Hubach and Hathaway, Arkansas. Plant healthy, great runner; berry small, shy bearer, of good quality.

Olympia (Perfect): Originated in California by W. M. Gray. Plant strong, some rust, a fair runner; berry light scarlet, seeds pink, resembles old Early Scarlet in appearance; of mild flavor, fairly firm, birds like them.

Parson's Beauty (Perfect): This standard did well; it is a good market berry; is being widely grown.

President (Imperfect): Plant large, but develops some rust, it did not do as well this year as last, its first fruiting. It is however, very highly spoken of in other places; I will give it a further trial.

Perfection (Perfect): Plant a good grower, some rust, a good runner and quite productive; berry conical, a good dark scarlet, medium firm, of good quality.

Peerless (Perfect): From Hubach and Hathaway, Arkansas. Plant large and strong, healthy, dark in color, a good runner; berry large, roundish, like Bismarck in appearance; good quality; worthy of a trial.

Prof. Fisher (Perfect): Seedling of Bubach and Sharpless, by J. H. Black, of N.J. Plant a strong grower, large and healthy, quite productive; berry large, resembles Glen Mary in shape, lighter color, of good quality, late.

RIDGEWAY (Perfect): Has been on the market for some years; plant is medium in size, stools somewhat; berry medium to large, dark red; does very well on some soils.

RYCKMAN (Perfect): Plant is healthy and a good runner, medium in productiveness; berry medium to large, with a neck roundish conical, mild flavor, good quality.

SUNNY SOUTH (Perfect): Sent out by Hubach and Hathaway of Arkansas. Plant large, shows some rust, made a poor showing; berry of very good quality; a shy bearer not desirable.

SPLENDID (Perfect): One of the best medium earlies for market; well known now; needs no description.

SUCCESS (Perfect): Plant is strong and vigorous and healthy, and productive; berry medium to large, fairly firm; a good early.

SAMPLE (Imperfect) SEAFORD (Imperfect): both well known; did very well; among the best.

SENATOR DUNLOP (Perfect): Plant medium in size but a good strong grower and productive of large, fine berries like the old Wilson; firm, ships well; one of the best for market, medium early.

SUTHERLAND (Imperfect) Did fairly well; good grower.

SUPERIOR (Perfect): Also did well.

TENNESSEE PROLIFIC (Perfect): Good strong plant, a vigorous grower, very healthy; berry good, bright scarlet, firm and of good flavor; one of the best market varieties; has always done well with me.

TEXAS (Perfect): Is classed as an early variety; the plant is of good size, healthy, does not make as many runners as some, but sufficient; berry fair in size, red, firm and of fair quality; medium in productiveness.

UNCLE JIM (Perfect), (See Armstrong): So like New York, Corsican, and others of same style; I see little or no difference; to describe one is to describe the whole class.

UNCLE SAM (Perfect): Plant is strong, healthy and a good grower; medium in productiveness; berry good, red, yellow seeds, medium to large; firm and fair quality; did well with me and is highly spoken of in other places.

VELVET (Imperfect): Seedling of Bubach and Jessie by R. C. Cronk, of Wisconsin; made a poor showing with me the past season; plant appeared weak; I have reset and will give it another trial; it is said to have done very well in some other places.

VAN DEMAN (Perfect): One of the best early sorts; does very well in some places, not so well in others; it runs through a long season, can be picked with the earliest, and some of the latest picked have been Van Deman; it is firm, very fine in appearance.

WONDER (Perfect), (or Sampsel's Wonder): Plant large, strong and healthy, a good runner and quite productive; berry large, conical, scarlet with red seeds, the berry has a neck, very good quality; well worth a trial by all growers, one of the best new ones, next to Cardinal with me; a good one judging from one season's trial.

WILSON (Perfect): The old Wilson did fairly well with me this season, did not have as much rust as usual.

WM. BELT (Perfect): Not as much rust as usual, did well, a good runner, quite productive; the first berry is sometimes somewhat irregular, but the rest are of regular, conical shape, large and firm and a good quality; a good one to grow.

WILLIAMS (Perfect): WARFIELD (Imperfect): WOOLVERTON (Perfect): Are all so well known they need no description; they have all maintained their place at the front.

YANT (Perfect): A desirable variety; plant strong, vigorous and healthy, makes plants freely, quite productive; the berry is of large size, quite regular, with a neck, conical in shape, of good color, medium in season; worthy of a trial by growers.

New Trial Plot.

Several new varieties were received and planted in the trial plot for next year's fruiting, some of them have done very well in other places according to reports. They are as follows:

Abingdon; Almo; Boston Prize; Catherine; Commander; Duncan; Elma; Howard's No. 3; Laxton; Mrs. Miller; Mead; Himrod; North Shore; New Home; President Roosevelt; Reynolds; Three W's; Victor; Wild Wonder; Stevens' Late Champion. Of the above all have done well in the way of making plants, no rust as yet seen, Nov. 15. The *Three W's* and Wild Wonder have made the widest row. Victor is a grand plant, strong dark foliage and fine runner. Abingdon also has made a fine row of strong healthy plants; trust they may come through the winter well; I have given them a new lot of coarse manure.

LIST FOR GROWERS AND SEASON OF FRUITING.

Extra Early and Early.

Van Deman, Michel, Success; Cameron; Excelsior; Howard's No. 103; Johnson's Early; Beder Wood; Lord Sheffield; Clyde; Texas; Early Hathaway; Fairfield; Ham; Staples.

Mid Season.

Bubach; Haverland; Ben Davis; Sutherland; Splendid, Bismarck; Tennessee Prolific; Senator Dunlap; Parson's Beauty.

Mid Season to Late.

Glen Mary; Lyon; Marie, Saunders; Williams; Wm. Belt; Lovett; Brandywine; Emperor; Woolverton; President; Kitty Rice; Yant; Mrs. Fisher; Sample.

Late to Extra Late.

Joe; Gandy; Klondike; Nettie; Robbie; Aroma; Lester Lovett; Granville; Uncle Sam; Uncle Jim; Latest; Enhance; Howard's 96; Wonder; Perfection.

NOTES BY CHAS. YOUNG, RICHARD'S LANDING, ONT.

Strawberries have not been quite so profitable a crop as in some former years; just what the reason was I cannot say. They were kept clean, the weather was favorable, the berries set, but many did not mature. Our old standby Clyde was very nearly a failure. I think the plants are running out. Haverland again this year was the most profitable berry; with Brandy wine as a good second; these are both good berries with me. I never like to

tell anyone what strawberries he should plant for profit. I plant in rows four feet apart and two feet in the rows, letting all runners grow, merely straightening them to keep in the row. Saunders and Williams are liable to have green tips with me, which spoil their appearance; they do not yield as well as some others; I have found it more profitable to take only one crop and turn them under.

I have never yet satisfied the local demand, although increasing the size of the plot every year. The crop of 1905 sold at 10c a box, or $1.00 per 10 quart basket. I have received this year for test the following:—Texas, all alive; Success, alive; August Luther, all dead; Monitor, Splendid, Tennessee Prolific; Senator Dunlap, Glen Mary, Joe, Sample, Parson's Beauty. They are all planted on uniform ground and I purpose to carefully note condition in spring; time of blossoming; freedom from rust; date of first and last picking; and yield per plant. I have twenty-four varieties under test. I discarded Rio, and Van Deman; I give no winter protection; I cultivate once in the spring, as soon as I can get the ground dry enough.

GENERAL NOTES.

Notes by Harold Jones, (*St. Lawrence Station*).

Apples: The climatic conditions of 1904-5 may be considered in every way favorable to fruit growers in this section, and trees that had suffered slight injury during the previous winter had every chance to recover their former vigor, and in most cases they have apparently done so. The fruit buds came through the winter in a healthy, normal condition and produced a perfect bloom that set fruit well. The crop was below medium in quantity which has left the trees in a healthy, vigorous condition for the winter now coming on. Insects were not very numerous, though codling moth did more damage than for several years past. "Spot" developed to an alarming extent late in August, and reduced a crop of otherwise perfect fruit by at least forty per cent. There were several causes that led to this sad condition of affairs such as almost entire freedom from "spot" in 1904; the low price of fruit; and the weakened condition of the trees, which all had a tendency to cause indifference, disappointment or disgust among the growers, resulting in very little or no spraying being done in 1905 until late in the season, where people began to realize that good apples would bring good prices. Then they began to spray but were too late to remedy the damage already done; all of which goes to show that there is still lack of appreciation of the fact that only good, clean, well grown fruit will pay any year, and that a high class product will give fair returns every season.

After several seasons of close observation I am confirmed in my opinion that cultivation of our apple orchards must not be continued past midsummer. When clean cultivation is practiced and continued up to the 1st of August, followed by a cover crop, the growth of new wood is continued so late in the season that it goes into winter in a green, sappy condition and serious injury is the result; and, more than that, the cover crop is very scanty and leaves the ground and root system in a bare and unprotected condition.

Cultivation should cease and the cover crop be sown by the first of July; then you will get well ripened, hard shelled fruit bud and the terminals of the new growth will be ripened before winter sets in, thus placing the

tree in the best possible condition to withstand temperatures of 25 to 30 degrees below zero, such as we are liable to have in this section some years.

I think this question of cultivation of orchards and when it should cease, in order to obtain the best results in hardiness of tree and bud, keeping in mind the results on the growing crop of fruit, should be given careful study and thought by the experimenters in the different sections of the Province, which would result in a better knowledge of the requirements of each section and would do away with the too broad question of to-day in many sections: cultivation *versus* sod in orchards.

Pears and Plums: As will be seen by my report of 1904, were nearly all injured or killed by the freeze of that year and it is safe to say that they can never be grown here in a commercial way; although a few varieties give promise of being satisfactory for the home garden. The detailed report on varieties will show the results of this year's experiments.

Sour Cherries were very satisfactory this year and gave fair crops; further experiments along this line will probably result in my being able to give a satisfactory list for the home garden with possibly some commercial value.

Notes by A. W. Peart, (*Burlington Station*).

The varieties of fruits here are divided as follows:—

Apples	67	Blackberries	22
Pears	46	Raspberries	2
Plums	54	Currants	30
Peaches	13	Gooseberries	6
Cherries	11		
Grapes	30		281

The fruit crop in the Burlington district was good, and, with the exception of the more tender varieties of blackberries, all fruits passed the winter in excellent condition. The season was favorable, plenty of moisture and sufficient heat. Growth of wood has been, perhaps, too abundant. Insects were numerous, but fungi were below the average. Power spraying is becoming quite general.

Apples were an average crop of excellent quality. The codling moth was plentiful, but spots were scarce. Prices were good.

Pears were a light crop. A severe frost about May 23rd, when some of the leading varieties were in full bloom, so injured the blossoms, that there were but few Anjou and Duchess. Clapp's Favorite, Bartlett, Kieffer, Winter Nelis, Josephine, Giffard, Wilder, however, gave a good yield. Prices were fair.

Plums were a moderate crop. Many of the European varieties, such as Lombard, Yellow Egg, Reine Claude, and Imperial Gage suffered considerably from rot. Bradshaw, Niagara, Glass and the Japan varieties were, however, comparatively exempt. The latter class gave a heavy yield of good fruit. The curculio did not work much injury.

Peaches were a good crop of excellent quality. The peach curl cut no figure.

Cherries were a fair crop, and sold at high prices.

Grapes were a good crop of excellent quality. There was practically no rot nor disease among them. The vineyards were sprayed three times, twice with Bordeaux, and the last time with the ammoniacal solution of copper corbonate. Prices ranged from 2 to 5 cents per lb.

BLACKBERRIES were a fair crop. The tender varieties were injured by the winter and gave but little fruit.

RASPBERRIES were a good crop of excellent quality.

CURRANTS gave an average yield at advanced prices.

GOOSEBERRIES were an average crop. There was little mildew, and prices ruled higher than usual.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

The winter of 1904-5 was not so severe as the previous one, still quite a number of plum, cherry and apple trees were killed, owing to their weakened condition from the previous winter. The spring opened very favorably; all trees and plants that had not been damaged previously, came out in fine condition. Later on, where the trees were in full bloom, cold, heavy rains set in, making spraying very difficult and causing trees that were weak, and orchards that were not cultivated, to cast all their fruit; hence the apple crop in this district was nearly a total failure. Plums were very good, and the crop was all harvested and sold at fair prices.

Pears were a light crop, but not much grown in this district. The young pear plantation at this station has not come into bearing yet, but the trees are doing well.

Cherries were very good, with good demand and good prices.

All small fruits were excellent, with the exception of black currants. Not much planting was done at this station last spring. A few trees of new varieties were added to the already large list of fruits. As none of the young apple trees fruited this season, no report can be given as to yield.

The experiments that are being conducted at this station in regard to the working of tender and more suitable varieties on hardy stalks are doing nicely.

York Imperial is grafted on Barry; Stark on Alexander; Spy on Tolman: King on Tolman; Baldwin on Tolman; and Baldwin on Ribston.

In pears, I am working Bartlett-Seckel on Kieffer; Duchess on Kieffer; Louise on Kieffer; and have a number of Kieffers planted with a view of grafting other desirable varieties on them. Under this method we will in a few years be able to have something definite as to whether certain varieties will do best by working on their own stocks, or will be improved on hardy stocks.

All undesirable varieties of young apple trees will be worked over as soon as a thorough test has been made. Clean cultivation is practiced success.

Nearly all varieties of apples do well in this district, but all have not throughout the plantation, believing it the only method that will bring

NOTES BY JOHN MITCHELL, (*Georgian Bay Station*).

This has been a most discouraging year for fruit growing in this district. The winter was unusually severe, following the extreme cold of the previous winter, which killed half the plums, nearly all the peaches, many of the cherries and young Baldwin apple trees, and weakened many more so much that hundreds have died this past summer, after showing a few weak leaves and blossoms. In our own plantation of over twelve hundred trees there are only two or three hundred left. I don't expect that we will

have a real good crop of plums here again till we have new orchards. Most people seem rather pleased than otherwise. Plums have been so cheap for years that they were quite unprofitable.

In apples there is the lightest crop ever gathered in this district since fruit growing became a business. Although the spring opened early it soon became cold and wet for a long period about blossoming time. There was scarcely a day of sunshine. It was so cold the bees could not work, and too wet for the winds to carry the pollon which seems to be almost completely washed out. Not more than ten per cent. of a crop set and that not the best, which made it very expensive to gather and pack apples this fall.

Cherries were about half a crop and the quality was only fair.

Pears also were about half a crop; in some places the quality was very good, but generally rather poor.

Bush fruits were fairly good, being well covered with the deep snow during the hardest part of last winter.

Notes by G. C. Caston, (*Simcoe Station*).

There is little that is new to report this year. The full effect of the severe winter of 1903-4 was not fully realized until this year. Many trees were so badly injured, that they have since succumbed and we may be sure that anything that stood the test of that year may be classed as hardy enough for the locality in which they are growing. The varieties injured, but not killed, were; Ontario, Baldwin and Spy. The top grafted trees stood by far the best. A few Baldwin top grafted and a few Ontario, also top grafted, were injured slightly; but Spy top grafted was not injured at all. So I see no reason why I should not continue to preach the gospel of top grafting the best commercial apples upon good, healthy, hardy stocks.

The crop of apples throughout this district this year was below the average as to quantity and the quality was fair. Insect pests, with the exception of Codling Moth, were not troublesome, there was no injury from leaf eating insects at all. There is little or no injury from Borers in this district. This may be owing to the fact that Woodpeckers are quite plentiful here. The fungus scab is bad on some varieties of apples, and is quite likely to continue as nothing is being done by the majority of growers to prevent. Most of the orchards are small and generally neglected as to pruning and spraying. This is a stock county, generally speaking, and very few make a specialty of fruit growing. But, on the rolling lands of this County, where the soil is good, apples of the very finest quality can be produced, and we can do fairly well with several varieties of pears.

Experience teaches valuable lessons as the years go by, and I am convinced that in addition to pruning, spraying and cultivation, we have the still more important problem of fertility to deal with, feeding the trees a balanced ration. This matter does not receive the attention it deserves. I usually pack a few cars of apples every year, and have observed a good many orchards. I find that where the fertility is right the fruit is good, even where the other conditions of pruning and spraying are either entirely neglected or imperfectly done. There is the key note of successful fruit growing, the great unsolved problem with most of us, viz., Feeding the trees a balanced ration. Where the orchard is manured at all, it is with stable or barnyard manure; and, while I admit that there are hundreds of orchards that would be vastly benefited by a liberal dressing of it, yet it is not by any means a balanced ration for a fruit tree. There is too great a preponderance of nitrogen. This, especially in cold climates, should take

second place and potash and phosphatic manures stand first in importance, in order to build up a healthy, well balanced tree. Such a tree properly nourished, will bear perfect fruit of the best quality, while a fertilizer with an excess of nitrogen has the effect of producing a rampant wood growth which is sure to suffer severely in such winters as that of 1903-4. And I am convinced that by the exercise of good judgment in the proper fertilizing of orchards, we can do a great deal to prevent the damage by excessively cold winters such as that of 1903-4.

APPENDIX I.

FRUITS RECOMMENDED FOR PLANTING.

In Various Parts of the Province of Ontario, after Careful Tests of Varieties made at the Various Fruit Experiment Stations.

General Lists. After testing a large number of varieties of fruit at the various fruit stations, the Board of Control has decided upon the following as the most desirable for general planting.

District Lists. The District Lists given by the various experimenters show varieties especially adapted to the sections represented by their stations.

The term *Commercial* is intended to include the varieties most desirable for market purposes and the term *Domestic* those most desirable for home uses, either cooking or dessert.

These lists are given, as far as possible, in the order of ripening.

It is realized that there are many varieties not included in these lists which may do well *under special* conditions, yet which are generally not considered as desirable as those mentioned.

The Board of Control recognizing the great disadvantage which faces inexperienced persons who desire to engage in fruit growing for profit, because of the very large and confusing list of varieties, has ordered the publication of select lists of tested varieties which shall serve as a guide to intending planters.

Apples.

General List of the most Valuable Varieties for Market Approved by the Board of Control.

Summer.

Astrachan: Adapted to all sections except the extreme north.

Duchess: Adapted to all sections.

Fall.

Gravenstein: Adapted to all sections except the St. Lawrence River and other northerly portions of the Province.

Wealthy: Particularly valuable for northern sections.

Alexander: Especially for northern sections.

McIntosh: Adapted especially to the St. Lawrence River district, but can be grown over a much wider area.

Fameuse: Adapted especially to the St. Lawrence River district, but succeeds well over a much wider area.

Blenheim: Adapted to all sections except the St. Lawrence River district and other northerly portions of the Province.

Winter.

King: Adapted only to the best apple sections, and succeeds best when top grafted on hardy stocks.

Hubbardston: Adapted to the best apple sections.

Greening: Adapted to the best apple sections.

Baldwin: Succeeds best on clay land, and is adapted to the best apple districts.

Northern Spy: Adapted to the best apple districts, but can be grown with success farther north by top-grafting on hardy stocks. This is also a good method of bringing it into early bearing.

Ontario: An early and abundant bearer, but short lived. Recommended as a filler among long lived trees. Adapted to same districts as Northern Spy, which it somewhat resembles.

Stark: Adapted to best apple districts.

Varieties Especially Adapted to Home Use.

Summer.

Transparent: Adapted to all sections.
Primate: Adapted to best apple sections.
Sweet Bough: Adapted to best apple sections.
Duchess: Adapted to all sections.

Fall.

Chenango: Adapted to best apple sections.
Gravenstein: Adapted to best apple sections.
Wealthy: Especially adapted to northern sections.
McIntosh: Especially adapted to northern sections.
Fameuse: Especially adapted to northern sections.
Blenheim: Adapted to best apple sections.

Winter.

King: Adapted to best apple sections. Should be top grafted.
Wagener: Adapted to best apple sections.
Swayzie: Adapted to all sections except most northerly.
Greening: Adapted to best apple districts.
Tolman: Adapted to best apple districts.
Northern Spy: Adapted to best apple districts, but will succeed farther north if top grafted.
Mann: Adapted to best apple districts, but will succeed farther north if top grafted.

Hardy Varieties for Sections North of Latitude 46 Degrees.

Summer.

Yellow Transparent, Charlamoff.

Fall and Winter.

Duchess, Wealthy, Hibernal, Longfield, Patten, Whitney, Hyslop, Scott Winter.

Crabs Suitable for the Whole of the Province.

Whitney: A large crab of high quality, suitable for planting in the extreme north where other apples will not succeed. May be used for dessert or cooking.
Martha: An early crab of fair quality.
Transcendent: Yellowish crab, season early autumn.
Hyslop: Dark, rich, red crab, of late season, quality only fair.

District Lists, Recommended by the Experimenters.

Niagara District.

Commercial: Astrachan, Duchess, Gravenstein, Alexander, Blenheim, Cranberry, Hubbardston, King, Greening, Baldwin, Spy.

Domestic: Early Harvest, Sweet Bough, Duchess, Chenango, Gravenstein, Shiawassee, Fall Pippin, Fameuse, Swayzie, Wagener, Yellow Bellflower, Esopus (Spitzenburg), Tolman.

Bay of Quinte District.

Commercial: Duchess, Gravenstein, Trenton, Alexander, Wealthy, Fameuse, McIntosh, King, Greening, Baldwin, Ontario, Seek, Spy, Tolman, Ben Davis, Stark.

Domestic: Benoni, Primate, Gravenstein, Fameuse, McIntosh, Grimes, Greening (R.I.), Ontario, Spy, Tolman, Swayzie.

Burlington District.

Commercial: Astrachan, Duchess, Wealthy, Ribston, Blenheim, King, Greening, Baldwin, Spy.

Domestic: Astrachan, Sweet Bough, Gravenstein, Wagener, Seek, Golden Russet.

Lake Simcoe District.

Commercial: Duchess, Peerless, Alexander, Wolf, Blenheim, Pewaukee, Stark, and the following if top-worked on hardy stocks: Greening, King, Ontario, Baldwin, Spy.

Domestic: Astrachan, Primate, St. Lawrence, Fameuse, McIntosh, King, Spy.

Lake Huron District.

Commercial: Astrachan, Duchess, Wealthy, Fameuse, McIntosh, Blenheim, Greening, Baldwin, Spy, Golden Russet, Ben Davis.

Domestic: Transparent, Astrachan, Duchess, McIntosh, Grimes, Blenheim, King, Spy, Golden Russet.

St. Lawrence District.

Commercial: Duchess, Alexander, Wolf, Scarlet Pippin, Fameuse, McIntosh, Baxter, Milwaukee, Golden Russet.

Domestic: Transparent, Brockville Beauty, Scarlet Pippin, Fameuse, McIntosh, Blue Pearmain, Golden Russet, Yellow Bellflower.

Algoma District.

Commercial and Domestic: Astrachan, Transparent, Duchess, Charlamoff, Gideon, Longfield, Wealthy, Scott Winter.

BLACKBERRIES.

General List, Approved by the Board of Control.

Agawam, Snyder, Eldorado, and for southern sections, Kittatinny.

District Lists, Recommended by the Experimenters.

Burlington District.

Commercial and Domestic: Snyder, Ancient Briton, Western Triumph, Agawam, Taylor.

Lake Simcoe District.

Commercial and Domestic: Agawam, Eldorado.

Cherries.

General List, Approved by the Board of Control.

Hardy: Orel 25, Orel 24, Early Richmond, Montmorency, Russian 207.

District Lists, Recommended by the Experimenters.

Niagara District.

Commercial: Wood, Knight, Napoleon, Tartarian, Dyehouse, Montmorency, Late Duke, Elkhorn, Windsor, English Morello.
Domestic: May Duke, Cleveland, Knight, Elton, Tartarian, Hortense, Choisy, Black Eagle, Mezel, Royal Duke.

Lake Simcoe District.

Commercial and Domestic: Orel 24, Ostheim, Lithaur, Russian 207, Bessarabian, Dyehouse, English Morello.

Algoma District.

Commercial and Domestic: Early Richmond, Montmorency, English Morello.

Bay of Quinte District.

Commercial and Domestic: Early Richmond, Montmorency.

St. Lawrence District.

Commercial and Domestic: Early Richmond, Montmorency; Orel 24, English Morello.

Currants.

General List, Approved by the Board of Control.

Black: Black Victoria, Champion, Lee, Naples, Saunders.
Red: Cherry, Fay, Pomona, Red Cross, Victoria, Wilder.
White: White Grape.

District Lists, Recommended by the Experimenters.

Burlington District.

Commercial:
Black: Lee, Naples, Saunders.
Red: Cherry, Fay, North Star, Prince Albert, Victoria, Wilder.
White: White Grape.

Lake Huron District.

Black: Champion, Naples, Saunders.
Red: Pomona, Red Cross.

Gooseberries.

General List, Approved by the Board of Control.

Pearl, Downing, Red Jacket. Whitesmith is one of the best English varieties, but is almost valueless on some soils and in some localities owing to mildew.

Grapes.

General List, Approved by the Board of Control.

Commercial and Domestic:
Black: Moore, Campbell, Worden, Concord, Wilder.
Red: Delaware, Lindley, Agawam, Vergennes.
White: Niagara, Diamond.
For Northern Sections:
Black: Champion, Moore, Campbell, Worden, Wilder.
Red: Moyer, Brighton, Delaware, Lindley.
White: Winchell, Diamond.

District Lists, Recommended by the Experimenters.

Wentworth District.

Commercial:
Black: Champion, Moore, Campbell, Worden, Concord.
Red: Delaware, Lindley, Agawam, Vergennes, Catawba.
White: Niagara, Diamond.
Domestic:
Black: Black Delaware, Early Dawn.
Red: Jefferson, Mills.
White: Winchell, Golden Drop.

Niagara District.

Domestic: Moyer, Campbell, Worden, Delaware, Lindley, Brighton, Wilder, Agawam, Requa.

Peaches.

General List, Approved by the Board of Control.

Commercial:
Sneed: Whitefleshed, clingstone, quality only fair, earliest of all.
Alexander: Whitefleshed, clingstone.
Hynes: Whitefleshed, semi-cling, quality good.
St. John: Yellowfleshed, freestone, quality good.
Mountain Rose: Whitefleshed, freestone, quality very good.
Early Crawford: Yellowfleshed, freestone, quality very good.
Champion: Whitefleshed, freestone, quality very good, for home use or near markets.
Brigdon: Yellowfleshed, freestone, quality good.
Fitzgerald: Yellowfleshed, freestone, quality very good.
Reeves: Yellowfleshed, freestone, quality fair, large size.
Elberta: Yellowfleshed, freestone, quality fair, good for long distance shipments.
Oldmixon: Whitefleshed, freestone, quality good.
Stevens: Whitefleshed, freestone, quality good.
Smock: Yellowfleshed, freestone, quality fair, very late, good shipper.
Domestic:
Hynes, St. John, Early Crawford, Oldmixon, Longhurst, Stevens.

District Lists, Recommended by the Experimenters.

Niagara District.

Commercial: Sneed, Alexander, Greensboro, St. John, Early Crawford, New Prolific, Champion, Elberta, Willet, Smock.

Domestic: Rivers, Hynes, St. John, Early Michigan, Lewis, Crosby, Champion, Reeves, Wonderful, Jacques Rareripe, Wheatland, Longhurst.

Essex District.

Commercial: Alexander, St. John, Brigdon, Early Crawford, Fitzgerald, New Prolific, Engol, Elberta, Golden Drop, Kalamazoo, Banner, Smock.

Domestic (Whiteflesh): Alexander, Mountain Rose, Oldmixon, Stevens.

(Yellowflesh): St. John, Early Crawford, Fitzgerald, New Prolific, Engol, Crosby, Golden Drop, Banner.

PEARS.

General List, Approved by the Board of Control.

Commercial: Giffard, Clapp, Bartlett, Boussock, Flemish (hardy, subject to spot), Howell, Louise, Duchess, Bosc, Clairgeau Anjou.

Domestic: Summer Doyenne, Giffard, Bartlett, Flemish (for the north), Sheldon, Seckel, Bosc, Anjou, Lawrence, Josephine, Winter Nelis.

District Lists, Recommended by the Experimenters.

Niagara District.

Commercial: Chambers, Wilder, Giffard, Clapp, Bartlett, Hardy, Bosc, Howell, Louise, Duchess, Pitmaston, Clairgeau, Anjou, Easter Beurre.

Domestic: Doyenne, Manning, Giffard, Boussock, Rosteizer, Marguerite, Sheldon, Seckel, Triumph, Ritson, Louise, Hardy, Diel, Anjou, Lawrence.

Burlington District.

Commercial: Wilder, Clapp, Bartlett, Boussock, Louise, Duchess (dwarf), Anjou, Kieffer, Winter Nelis, Easter Beurre.

Domestic: Wilder, Bartlett, Louise, Anjou, Winter Nelis.

Bay of Quinte District.

Commercial and Domestic: Giffard, Tyson, Clapp, Boussock, Hardy, White Doyenne, Dempsey, Bosc, Clairgeau, Goodale, Lawrence, Josephine.

St. Lawrence District.

Domestic: Clapp, Flemish, Ritson.

PLUMS.

General List, Approved by the Board of Control.

Commercial and Domestic:

American: These are extremely hardy and are desirable where the European and Japanese varieties cannot be grown: Aitkin, Cheney, Bixby, Mankato, Wolf, Hawkeye, Stoddard.

European: Bradshaw, Imperial Gage, Gueii, Shipper's Pride, Lombard (liable to over bear, requires thinning), Quackenboss, Yellow Egg, Grand Duke, Golden Drop (Coe), Reine Claude (one of the best for canning).

Japanese: These are apparently quite as hardy as the European varieties: Red June, Abundance, Burbank, Chabot, Satsuma (red fleshed, desirable for canning).

District Lists, Recommended by the Experimenters.

Lake Huron District.

Commercial and Domestic: Red June, Ogon, Burbank, Bradshaw, Imperial Gage, Gueii, Shipper's Pride, Victoria, Quackenboss, Yellow Egg, Monarch, Grand Duke, Satsuma.

Georgian Bay District.

Commercial and Domestic: Red June, Burbank, Washington, Bradshaw, Imperial Gage, Quackenboss, Arch Duke, Diamond, Monarch, Yellow Egg, Golden Drop (Coe), Satsuma, Reine Claude.

Burlington District.

Commercial:

European: Bradshaw, Niagara, Imperial Gage, Lombard, Yellow Egg, Glass, Reine Claude.

Japan: Red June, Abundance, Burbank, Chabot, Satsuma.

Domestic: Abundance, Saunders, Bradshaw, Imperial Gage, Smith, Orleans, Lombard, Yellow Egg, Satsuma, Reine Claude.

Niagara District.

Commercial: Red June, Burbank, Bradshaw, Chabot, Gueii, Golden Drop (Coe), Quackenboss, Satsuma, Reine Claude.

Domestic: Abundance, Washington, Yellow Egg, Shropshire, Quackenboss, Satsuma, Reine Claude.

St. Lawrence District.

Domestic:

European: Gueii, Lombard, Shipper's Pride, Glass.

Japan: Red June, Burbank.

American: Milton, Whitaker, Hammer.

Quinces.

General List, Approved by the Board of Control.

Fuller, Orange (the leading market variety in Ontario), Champion (for Southern Ontario only as it ripens too late for other sections).

Raspberries.

General List, Approved by the Board of Control.

Black: Hilborn, Older, Gregg, Smith Giant.
Purple: Columbian, Shaffer.
Red: Marlboro, Herbert, Cuthbert.
White: Golden Queen.

District Lists, Recommended by the Experimenters.

Lake Huron District.

Commercial and Domestic:

Black: Hilborn, Conrath, Older.
Purple: Columbian, Shaffer.
Red: Marlboro, Herbert, Cuthbert.

Strawberries.

General List, Approved by the Board of Control.

Commercial: Splendid (Perfect), Bederwood (P.), Warfield (Imperfect), not suited to light sandy soil, Greenville (Imp.), Williams (P.), Saunders (P.), Sample (Imp.), Irene (Imp.), Buster (Imp.).

Domestic: Van Deman (P.), Splendid (P.), Excelsior (P.), Senator Dunlap (P.), Ruby (P.), Bubach (Imp.), Irene (Imp.), Belt (P.), Lovett (P.).

Note.—In selecting varieties for planting, perfect-flowered varieties should be included to fertilize those having imperfect flowers.

APPENDIX II.

UNDESIRABLE VARIETIES OF FRUIT FOR COMMERCIAL ORCHARDS,

In the Various Fruit Districts, as Proven by Tests Made at the Various Fruit Stations of Ontario.

Apples.

Niagara District: Blue Pearmain, Canada Baldwin, Cooper's Market, Early Harvest, Early Strawberry, Esopus Spitzenberg, Fall Pippin, Fameuse, Golden Sweet, Beauty of Kent, Keswick Codlin, Lady, Maiden Blush, St. Lawrence, Swaar, Vandevere, Yellow Bellflower, Yellow Transparent.

Bay of Quinte District: Archer, Akin, Barry, Baxter, Beauty of Kent, Blunt, Barcelona Pearmain, Cabashea, Canada Reinette, Cellini, Carlough, Dora, Ella, Eicke, Green Fameuse, Golden White, Grand Sultan, Haas, Hastings, Hawley, Highland Beauty, Hurlburt, Haskell' Sweet, Hamilton, Isabella, Isham, Lady, Lady Henniker, Lady Sweet, Lawver, Landsfinger Reinnette, Maggie, Magog Red Streak, Mountain Tulip, Mountain Beet, Newtown, Norcaster Spy, Plumb's Cider, Powell, Pioneer, Rawles Janet, Royal Russet, Rivers Winter Peach, Rochelle, Scott Winter, Sops of Wine, Stump, Switzer, Scott Russet, Starr, Utter Red, Wine Sap, Winter St. Lawrence, White Winter Pearmain, Willow Twig, White Pippin, Winter Fameuse, Walbridge, Whinnery.

Burlington District: Holland Pippin, Snow, Pewaukee, Keswick Codlin, Rambo, Cranberry Pippin.

Lake Huron District: Alexander, Barry, Cayuga, Colvert, Early Harvest, Early Joe, Fall Jenneting, Fall Pippin, Gideon, Haas, Hawley, Keswick Codling, Lowell, Maiden's Blush, Pomme Grise, Pound Sweet, Rambo, Swayzie, Sour Bough, Tetofsky, Walbridge, Wine Sap, Wolf River.

St. Lawrence District: Aikens Red, Blenheim Pippin, Chenango, Dartmouth crab, Excelsior crab, Gideon, Hurlburt, Hibernal, Longfield, Late Strawberry, Mann, Magog Red, Ontario, Orion crab, Palouse, Peach of Montreal, Roman Stem, Salome, Sutton Beauty, Switzer, Shackleford, Waxon crab, Wine Sap, Yates Red.

Algoma District: Blenheim (tender), Ben Davis (sun scalds), Baldwin (very tender in trunk and top), Cranberry Pippin (tender), Greening, Mann (tender both in top and trunk), Rolf, Stark (sun scalds), Sweet Bough, Spy.

Blackberries.

Burlington District: Early Cluster, Early Harvest, Early King, Dorchester, Gainor, Humboldt, Lovett's Best, Maxwell, Minnewaski, Ohmer, Wachusetts, Wilson Junior.

Cherries.

Niagara District: Early Purple, Elton, Yellow Spanish, Choisy, Black Eagle, Ostheim, Vladimir, Mazzard, Amber, Rockport.

St. Lawrence District: Governor Wood, Black Knight, May Duke, Olivet, Reine Hortense.

Currants.

Burlington District: Belle de St. Giles, Brayle Seedling, New Victoria, Raby Castle, Red Dutch, Versailles, White-Imperial.

Grapes.

Niagara District: Bacchus, Clinton, Diana, Dracut Amber, Duchess, Early Dawn, Eumelan, Faith, Goethe, Hartford, Isabella, Ives, Mills, Noah, Pocklington, Telegraph.

Peaches.

Niagara District: Amsden, Barnard, Early Purple, Early Rivers, Triumph, Late Crawford, Lemon Cling, Morris White, Wager, Bowslaugh, Kalamazoo.

Pears.

Niagara District: Brandywine, Buffum, Dearborn, Elizabeth, Flemish Beauty, Idaho, Jones, King Sessiny, Koonce, Lawson, Le Conte, Mount Vernon, Onondaga, Osband, Pound, Tyson, Vicar, White Doyenne.

Burlington District: Buffum, Flemish Beauty, Idaho, Petite Marguerite, President Drouard, Sudduth, Summer Doyenne.

St. Lawrence District: Bartlett, Seckel, Beurre Clairgeau, Bessemianka, Bergamot, Beurre Hardy, Cherburn, Dempsey, Goodale, Japan Golden Russett, Howell, Idaho, Lincoln, Lincoln Coreless, Le Lecture, Varonish, Vermont Beauty, Winter Pear.

Plums.

Georgian Bay District: Admiral De Riany, Becksley, Berckmans, Brunswick, Czar, Copper, Communion, Chas. Downing, Comfort, Cheney, Forest Rose, Golden Cherry, Hattankio, Hammer, Hungarian Prune, Milton, Maru, Normand, Ogan, Orange Prune, Pottawattamie, Saunders, Tatge, Ungarish, Willard, Wild Goose, Wolf, Whitaker, Wyant, Youkin's Golden; and to these might be added General Hand for its poor bearing.

Burlington District: Weaver, Fellenberg, Marianna, Czar, Shropshire.

St. Lawrence District: Abundance, Blood No. 4, Burbank, Berckmans, Communia, Chabot, Charles Downing, Coe's Violet, Forest Garden, Green Gage, Gold, Grand Duke, Hughes' Seedling, Hatankio, Kelsey, Lombard Improved, Large Golden, Muir, Montreal, Moore Arctic, Normands, Pond Seedling, Satsuma, Saunders, Tatge, Wickson, Yellow Egg.

Raspberries.

Lake Huron District: Brandywine, Caroline, Miller, Reliance, Thompson, Turner.

Thirty-Sixth Annual Report

OF THE

Entomological Society

OF

ONTARIO

1905.

(Published by the Ontario Department of Agriculture, Toronto.)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty.
1906.

WARWICK BRO'S & RUTTER, Limited, Printers,
TORONTO.

To the Honorable WILLIAM MORTIMER CLARKE, K.C.,
Lieutenant-Governor of Ontario.

MAY IT PLEASE YOUR HONOR:

The undersigned begs to present herewith for the consideration of His Honor the Report of the Entomological Society of Ontario for 1905.

Respectfully submitted,

NELSON MONTEITH,
Minister of Agriculture.

TORONTO, 1906.

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THIRTY-SIXTH ANNUAL REPORT

OF THE

Entomological Society of Ontario

1905.

To the Honourable Nelson Monteith, Minister of Agriculture:

SIR,—I have the honour to present herewith the Thirty-sixth Annual Report of the Entomological Society of Ontario, which contains the proceedings of the Forty-second Annual Meeting of the Society. By kind invitation of President Creelman, this was held at the Ontario Agricultural College, Guelph, and was one of the most successful and interesting in the annals of the Society. The following Report contains a full account of the proceedings, the papers read and discussed and the reports of the various Officers and Branches of the Society. Two new Branches have been formed during the present year, one in British Columbia and the other at Guelph, and large additions have been made to the membership.

The *Canadian Entomologist*, the monthly magazine of the Society, has been regularly issued during the year, and has now completed its thirty-seventh volume, containing no less than 428 pages.

I have the honour to be, Sir,

Your obedient servant,

CHARLES J. S. BETHUNE,
Editor.

LONDON, Ontario.

Entomological Society of Ontario.

OFFICERS FOR 1905-1906.

President—J. D. Evans, F.L.S., C.E., Trenton.
Vice-President—Dr. James Fletcher, Ottawa.
Secretary—W. E. Saunders, London.
Treasurer—J. A. Balkwill, London.
Directors: Division No. 1—C. H. Young, Hurdman's Bridge.
Division No. 2—C. E. Grant, Orillia.
Division No. 3—J. B. Williams, Toronto.
Division No. 4—G. E. Fisher, Burlington.
Division No. 5—Prof. Franklin Sherman, Guelph.

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Librarian and Curator—Rev. C. J. S. Bethune, London.

Auditors—W. H. Hamilton and F. A. Stuart, London.

Editor of the "Canadian Entomologist"—Rev. Dr. Bethune, London.

Editing Committee—Dr. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; Prof. Lochhead, Guelph; G. E. Fisher, Burlington; J. B. Williams and C. W. Nash, Toronto.

Delegate to the Royal Society—A. F. Winn, Montreal.

Delegates to the Western Fair—J. A. Balkwill and W. E. Saunders.

Finance Committee—J. Dearness, J. A. Balkwill and Dr. Bethune.

Library and Rooms Committee—Messrs. Balkwill, Bethune, Bowman, Dearness and Saunders, London.

Entomological Society of Ontario.

ANNUAL MEETING.

The forty-second annual meeting of the Society was held, by kind invitation of President Creelman, at the Ontario Agricultural College, Guelph, on Wednesday and Thursday, October 18th and 19th. Owing to the unavoidable absence of Mr. John D. Evans, President of the Society, the chair was taken by the Vice-President, Dr. James Fletcher, Dominion Entomologist and Botanist, Ottawa. Among those present were: Rev. Dr. Fyles, Quebec; Mr. H. H. Lyman, Montreal; Mr. C. H. Young, Hurdman's Bridge; Mr. Arthur Gibson, Ottawa; Mr. C. C. James, Deputy Minister of Agriculture for Ontario; Messrs. J. B. Williams and C. W. Nash, Toronto; Mr. G. E. Fisher, Burlington; Rev. Dr. Bethune, London; President Creelman, Professors Lochhead, McCready, Sherman, Hutt, Reed, Messrs. Zavitz, Barlow, Jarvis, Hotson, Klugh, and others, Guelph. There were also present a large number of the young women students from the Macdonald Institute and of young men from the Agricultural College. At some of the meetings the attendance was over one hundred. The Society was also favored with the presence of Professor John B. Smith, State Entomologist of New Jersey, and a Professor in Rutger's College, one of our honorary members.

During the first morning a business meeting of the Council was held, at which the Treasurer's report was received and adopted. Application was made by a number of gentlemen belonging to the Agricultural College and the Wellington Field Naturalists' Club for the formation of a Guelph Branch of the Entomological Society of Ontario. The request was very heartily acceded to, and the Branch was inaugurated with an initial list of twenty-four members.

Professor T. D. A. Cockerell, of the University of Colorado, Boulder, Colo., an eminent entomologist, especially distinguished by his work in the Coccidæ and Hymenoptera, was unanimously elected an honorary member.

The members of the Society from a distance were very hospitably entertained at luncheon by President Creelman.

In the afternoon Dr. Fletcher took the chair at 2.30 o'clock, and called upon the Directors of the Society to read their reports on the noteworthy insects of the year in their respective divisions. The reports for the first three Divisions were read, and Mr. Fisher explained his inability to prepare a report for Division 4 owing to the pressure of business during the summer months. Prof. McCready also had no report to make for Division 5, as he had removed from London to Guelph before the opening of the season, but his place was filled by Dr. Bethune.

REPORTS ON INSECTS OF THE YEAR.

Division No. 1—Ottawa District. By C. H. Young, Hurdman's Bridge.

Like the two preceding years, the season of 1905 has not, in the Ottawa District, been marked by any serious outbreaks of injurious kinds of insects.

Early in the season the Red-backed cutworm, *Paragrotis ochrogaster*, was

very bad in gardens at Meach Lake, Que., being particularly destructive to onions, peas, cucumbers, vegetable marrow, and broad beans. These caterpillars were extremely abundant in one garden which I was observing, and some evenings I killed as many as 150 and 200 specimens. Poisoned bran-mash was applied, and while this must have done some good, still the cutworms were so numerous that almost every green garden crop was eaten.

The Onion Maggot, as far as I observed, was not nearly so prevalent this year as it was in 1904. Dr. Fletcher tells me that this season he has had success with the Cook carbolic wash. In years of bad infestation nothing, however, acts as a perfect remedy.

Tent caterpillars were slightly more numerous in 1905 than they were in 1904, and it would seem as if these troublesome insects are again on the increase. Everyone can do something to lessen the numbers of these caterpillars by cutting off, whenever seen, the unsightly tents and trampling upon the contained larvæ.

An insect which has been rather abundant in some orchards in my district, is the Woolly Aphis (*Schizoneura lanigera*) of the apple. (Fig. 1.) The large snowy deposits on the limbs and trunks of trees are quite conspicuous and when seen should be destroyed. This can be done in most instances if the trees are not too large, by brushing the clusters off with a whisk, or some other such instrument, dipped in kerosene emulsion, or even pure coal oil. The Woolly Aphis on the alder has also been more than usually abundant this year around Ottawa, some trees being almost wholly covered with these insects. The Woolly Aphids on the alder are interesting on account of the larvæ of *Feniseca tarquinius* feeding upon them. This year these larvæ were quite abundant among these Woolly deposits, and I have brought some of the curious chrysalids to show here at this meeting. The larvæ of Syrphus flies were also busily engaged feeding upon the Woolly Aphids.

Young strawberry plants were destroyed in spring by White Grubs, the larvæ of the well-known June Bugs. They seemed to be very abundant the past season.

In apple orchards, in which spraying had not been practised, Codling Moth caterpillars did serious harm. In some orchards fully half the crop of apples was destroyed. In the Ottawa District, I feel sure, however, that owners of orchards are realizing more and more every year the value of spraying their trees to protect them from insect and fungous enemies.

Red currant bushes were defoliated in some gardens by the well-known Currant Saw-fly larvæ. As it does not take these larvæ very long to strip a bush of its foliage, as soon as they are noticed a remedy should at once be applied. There are two broods of this insect in the season. The remedy for the first one is to spray the bushes with a Paris green or some other arsenical solution. For the second brood, which appears later in the season when the fruit is formed, white hellebore should be dusted on to the bushes.

On some radish plants in my garden at Hurdman's Bridge this autumn, which had gone to seed, I noticed a great number of specimens of the Zebra caterpillar (*Mamestra picta*) (Fig. 2). As I was away at Meach Lake during the summer, I have not been able to find out yet whether they did any serious damage in turnip fields, etc., near by. The Birch Bucculatrix (*B. Canadensisella*) was very bad on white birch trees at Meach Lake, the leaves having a scarred appearance, and falling prematurely from the trees. The insect did not occur on birches nearer to Ottawa.

Fall Webworm was also noticeably abundant in September on forest trees and in orchards. This insect is such an easy one to destroy in orchards that it is a wonder to me owners do not cut off the colonies of caterpillars when first noticed.

The foliage of many maple trees around Ottawa was this year badly attacked by the Maple-leaf Gall mite, *Phytoptus quadripes*, on numerous fine trees, the leaves being conspicuously distorted by the galls made by this tiny mite.

I have brought to the meeting a collection of Micro-Lepidoptera which I have made at Ottawa and Meach Lake during the past two seasons. This year I have mounted up nearly 1,500 of these small moths. I have also brought some interesting larger moths, which are rare in the Ottawa District.

Division No. 2—Midland District. By C. E. Grant.

This has been a fine year for the entomologist, many species appearing in numbers surpassing anything seen since 1898, and whilst that was the case with some species, very little injury has been noticed or reported to me from injurious insects. Of course the Codling moth (*Carpocapsa pomonella*), the Potato-beetle (*Doryphora decemlineata*) are always with us, and Onion Maggots (*Phorbia ceparum*) and the Cutworms of various kinds were also plentiful *Mamestra arctica* in particular. I again note the scarcity of the imported Currant-worm (*Nematus ribesii*), the Tent-caterpillars (*Clisiocampa Americana* and *disstria*) and also the Tomato Hawk-moth (*Proptoparce celeus*). The Cottony Maple Scale was noted on the maple trees, but not in unusual quantities; Asparagus-beetles have not reached us yet. No complaints were received of the Pea-weevil. The Tussock moths were abundant this fall, *Antiqua* being by far the most plentiful.

I have added a lot of new moths to my collection not yet identified. The following I recognized, namely, *Macronoctua onusta, Panchrysia purpurigera, Hadena ducta, Perigea vecors, Remigia repanda, Prothymia rhodarialis, Marasmalus inficita, Noctua jucunda, Ancyloxypha numitor*, and a new Plusia, making twenty-one species of this genus taken in Orillia.

Butterflies were very numerous, *Grapta J. album, Vanessa antiopa, Pyrameis cardui* and *huntera*, and *Atlantis* very much more so than ever before noticed. The Geometrids were also very much in evidence; among several new ones mention might be made of *Phasiane Orilliata, Macaria glomeraria, Plagodis alcolaria*, and *Philereme Californiata*.

On October 14th I took *Remigia repanda, Aletia argillacea, Xylina antennata, Orthosia ferruginoides*, and *Scopelosoma tristigmata*.

Division No. 3—Toronto District. By J. B. Williams, Toronto.

I was not well enough during the past summer to do much entomological work, so that my observations on insect pests have been confined mainly to the ravages of the Grey Tussock moth (*Hemerocampa leucostigma*) on the shade trees in the streets of Toronto. (Figs. 3 and 4.) They were very numerous this year, especially on the horse-chestnuts.

The city authorities spent some money in the collection of the egg masses during the past winter, but there are so many infested trees in private grounds that the destruction of eggs on shade trees only cannot effectually check them. There are eight chestnut trees on the grounds in front of the house where I live, some of which were partially denuded of their foliage by these caterpillars. Towards the middle of July, while sitting under these trees, one could hear a continual patter on the grass as the creatures dropped themselves down from the branches; and quite an army of them were creeping about the ground for several days, while they sought for places to pupate. Females emerged and began to lay eggs about the 5th of August.

I offered a small sum to several boys on the street if they would clear the cocoons off those eight trees. Some of them were good climbers, and they collected, I believe, about two buckets full. The trees are now, apparently, free from them, and it will be interesting to observe next season to what extent this clearing has been effectual, for there are no other chestnut trees near them.

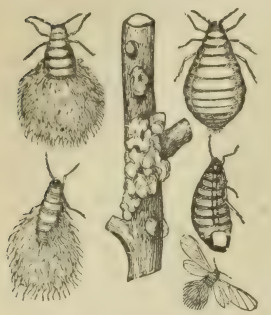


Fig. 1. Woolly aphis of the apple; much enlarged, except twig.

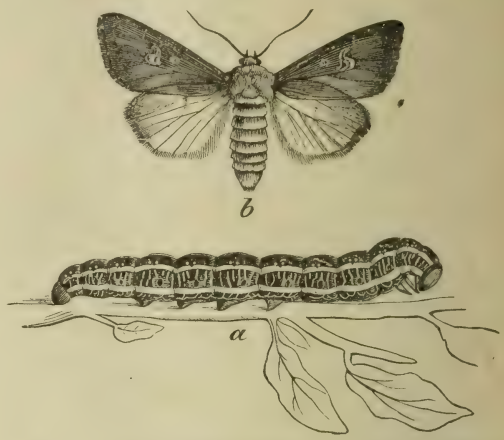


Fig. 2. *a* Zebra caterpillar, *b* the moth, Mamestra picta.

Walking-stick insects (*Diapheromera femorata*), which were so numerous in some localities last year, have only appeared this year in about their ordinary numbers.

Tent caterpillars, as far as I have noticed, have been comparatively scarce around Toronto, and Dr. Brodie's observations also confirm this statement.

I heard one complaint of apples, from a garden north of the city, having worms in them, but I had no opportunity to examine any of them.

Division No. 5—London District. By C. J. S. Bethune.

At the request of Professor McCready, whose appointment to the chair of Nature Study at the Macdonald Institute, Guelph, caused his removal from London last winter, I beg to make a report upon the noteworthy insects of the past season in that part of the country.

In the city of London itself public attention has been especially drawn to the widespread abundance of the Cottony Maple Scale (*Pulvinaria innumerabilis*, Rathv.) on the shade trees of the streets and boulevards of the city. (Fig. 5.) On the maple and basswood trees especially it was to be found in countless millions, and the cottony tufts of egg-masses on the underside of twigs and branches were so numerous and so close together as to look as if the boughs had been thickly spattered with whitewash. Towards the end of August the leaves on many trees were curled and withered from the continuous drain of the scale insects and began to fall prematurely; in some instances the trees were almost bare by the first of September. Grape vines, the Boston ivy, Virginia creeper, and many shrubs were included in the attack, and injury was also caused to plants and flowers by the constant drip of "honey dew" and the black fungus that grew wherever it fell. This attack has been going on for some years and steadily increasing in extent, and now it seems to have reached its culmination, and, we may hope, may begin to decline. Two years ago at our annual meeting, I gave an account of this

insect and an outline of its life history; as this was published in our Report for 1903, it is unnecessary to go over the same ground again. In September last the Park Superintendent and one of the aldermen asked the local members of the Society to report upon this insect and the Tussock moth to the City Council. This was accordingly done, and on the 2nd of October we attended at the City Hall and were invited by the Mayor to present any report we had to make.

Fig. 3. Tussock moth: *a* wingless female moth on its cocoon; *b* young caterpillar; *c* chrysalis of female; *d* of male; *e* male moth.

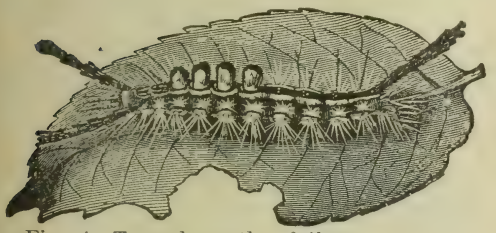


Fig. 4. Tussock moth: full-grown caterpillar.

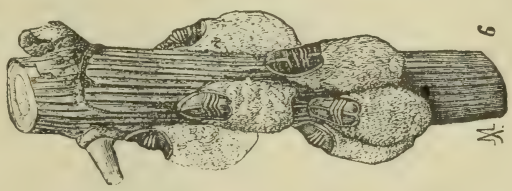


Fig. 5. Cottony maple scale; female scales with tufts containing eggs.

The Tussock moth (Figs. 3 and 4) was the subject of newspaper articles in the local press from time to time during the summer, and fears were expressed that, as it was very destructive in Toronto and doing some injury in Hamilton, it might soon reach London. We were able to assure the City Council that this dreaded insect had been well known in London to entomologists for thirty or forty years, and that during the past summer it had been as plentiful as usual. It was not, however, numerous enough to be a cause of any alarm, and no injury to the trees of the city could be charged to it. A simple method of preventing its increase was suggested and will no doubt be carried out, namely, the gathering and destroying during the winter the masses of eggs laid by the wingless female moth on her cocoon. These are white and conspicuous and in most cases within easy reach; they are so few in number that any householder could clear the trees on his own premises in a few minutes, and the work of removing them from the city trees would involve but little labor. It was recommended that only the cocoons bearing egg-masses should be destroyed, as the others contained either empty male chrysalids or parasites.

With regard to the Cottony Maple Scale, we were unable to suggest any practicable remedy. Two methods of dealing with the insect were mentioned as worthy of adoption by anyone who wished to protect his own trees: first, the spraying of the trees during the winter with the lime and sulphur wash that is found so effective in the case of the San Jose Scale, in order to destroy the female scales that winter on the twigs and branches of the trees; and secondly, by spraying of the trees with kerosene emulsion towards the end of June and during the first two weeks of July—three or four times in all—in

order to destroy the lice when they are hatched from the egg-masses and are moving about in search of a final resting place. At this particular time they are exposed and can be reached by spraying, but as soon as they attach themselves to the leaves and become covered with their scale they are practically invulnerable. The Park Superintendent was instructed to try these methods on selected trees and report results next year, but it was felt to be beyond the power of the city authorities to deal with the immense number of shade trees throughout the city, unless they were quite sure of exterminating the pest.

By way of encouragement I mentioned to the Council that this insect is well known in many cities in the United States, and the general experience has been that after a few years of abundance it ceases to be numerous for a time owing to the attacks of parasitic insects and the effects of atmospheric conditions. It does not, as a rule, kill the trees, because its attacks do not strip off the foliage nor entirely prevent the leaves from discharging their function, though when so numerous as at present they must certainly impair the vigor, if not the vitality, of the trees they infest. As an illustration of their numbers, I may mention that on a single maple leaf picked at random from a tree I counted 707 scales on the under side and 72 on the upper surface. When we consider the number of leaves on a large tree, the majority of which are infested. the specific name *innumerabilis* seems most appropriate.

There were several other insect attacks during the year that may be mentioned, but they did not attract public attention.

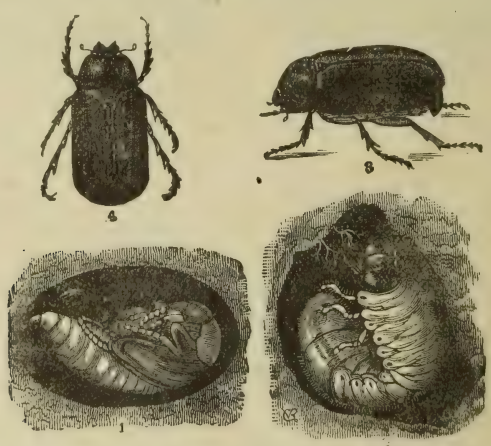


Fig. 6. May beetle: 1 pupa, 2 the white grub, 3 and 4 the beetles.

White grubs (larvæ of *Lachnosterna* or May Beetles) (Fig. 6), were complained of in some cases both in Woodstock and London on account of the damage they had done to lawns by devouring the roots of the grass. As they work underground and spend three years in the larval state, it is not easy to prescribe a remedy. In the case of old pasture fields, where they sometimes become very abundant, a simple remedy would be to plough up the sod and turn in pigs or turkeys, and then to grow a root crop. Where lawns are badly damaged it would be worth while to dig up the affected parts late in the autumn and expose the grubs to the frost, or during the summer to remove the sod and soak the ground below with coal oil. Subsequently new earth could be filled in and fresh turf laid.

Wire-worms (larvæ of *Elateridæ* or Click-beetles) were very abundant in many market gardens in the neighborhood of London. As these creatures also

work under ground it is difficult to find a remedy that will be effective. Much, however, may be done to reduce their numbers by trapping them. This is done by placing bunches of clover or sweetened meal poisoned with Paris green under shingles or pieces of board where they are troublesome. The insects are in the habit of taking refuge in the daytime beneath shelters of this kind and will naturally partake of the poisoned food they find provided for them.

The 12-spotted Asparagus beetle (*Crioceris 12-punctata*) is becoming each year more and more numerous in gardens about London. The other species, *C. asparagi*, has not yet made its appearance. Dusting with air-slaked lime seems to be the simplest and most effective remedy for getting rid of the larvæ which feed upon the foliage during the summer.

The Fall Web-worm (*Hyphantria textor*) has been somewhat in evidence with its unsightly webs on some trees here and there on the city streets, and on many shrubs and trees in Springbank Park. As soon as the Superintendent's attention was drawn to them, they were speedily got rid of in the Park, but on private grounds many were left unmolested. It is such an easy matter to remove the webs with a stick, and destroy the inmates by trampling under foot, that there is no excuse for neglecting them. It is true that they generally inflict but little damage upon the trees owing to the lateness of their attack, but they are very unsightly and are sometimes very injurious to young trees and shrubs.

The Codling Moth is reported to have been more prevalent than usual this year and to have considerably affected the apple crop about London. The increase of this serious pest is no doubt due to the neglect of spraying, and possibly to ignorance of the fact that there are two broods in the year in this region of country.

The Pea-weevil, on the other hand, is very little complained of, and could be effectually checked if a combined effort were made by all growers and seedsmen. Fumigation with bisulphide of carbon is an easy remedy and not expensive. Its general adoption would soon restore the growing of peas to the valuable position it formerly held in Ontario.

Regarding the Hessian fly, no complaints at all were heard and evidently no appreciable damage was done.

Cutworms, Squash-bugs, Onion and other root maggots were as prevalent as usual and gave the market gardeners much trouble. On the whole the season was not marked by any unusual or violent outbreak of insects, with the exception of the Cottony Maple Scale already referred to.

DISCUSSION OF THE DIRECTORS' REPORTS.

The Tussock moth was the first insect taken up for consideration.

Mr. T. D. Jarvis stated that at St. Catharines and in Toronto eighty per cent. of the cocoons that he examined were parasitized by Pimplas and Chalcid flies.

Prof. J. B. Smith explained that one of these classes of insects was a secondary parasite upon the other, and could not, therefore, be credited with aiding in the reduction of the Tussock moths, but rather the contrary.

Mr. C. W. Nash said that the Tussock moth was by no means confined to cities, as he had found them abundant all through the County of York and even as far away as St. Joseph's Island in Lake Huron. There he had found a female depositing its eggs as late as the 8th of October. His experience was very different from that of Mr. Jarvis, for he had only found one cocoon in 400 parasitized; many, however, were diseased and their contents had become fluid.

Prof. J. B. Smith had collected many egg-masses and found none that were parasitized. In the southern part of the State of New Jersey there were two broods of the insect in the year, but in the northern part only one. The city of Newark is situated on the dividing line between the life-zones, and consequently there are two broods in part of the city and only one in the rest. Ten cents per quart was paid for egg-masses collected, but he considered spraying with Paris green a much cheaper method of destruction, as it only cost about ten cents per tree, while egg-collecting came to $2.50 when the attack was severe. The egg-masses he found to contain an average of 200 eggs.

Dr. Fletcher, in reply to a question as to whether spraying should be discontinued in order to avoid killing the parasites as well as the noxious insects, stated that it was much safer to spray and be sure of killing the enemy, especially as there was no certainty regarding the work of the parasites. In answer to a further question, Does spraying kill internal parasites? he replied, Yes, if it destroys the insect which supplies its parasite with food. On one occasion he had found a number of parasites in egg-masses on trees at the corner of King and Simcoe streets, Toronto.

In remarking upon Dr. Bethune's paper, he stated that the Codling Moth was one-brooded from Toronto eastward and two-brooded westward. At Ottawa, where there is but one brood, spraying in the spring is sufficient for its control, but at London the conditions are quite different. For the Cottony Maple Scale he recommended treatment of the trees in winter with the lime and sulphur wash. White-grubs in lawns may be checked by freely spraying the affected portions with kerosene emulsion and then washing with water. Click-beetles, the parents of Wire-worms, are attracted in large numbers to the bait used at night in sugaring for moths, and might be largely destroyed by this means. It was remarkable that the twelve-spotted Asparagus beetle should have outstripped the other species in its advance westward through Ontario; the latter (*C. Asparagi*) was spreading very slowly. The Pea-weevil is at present somewhat scarce and therefore now is the time for a successful fight against it. The growers of peas should not pay five times too much for their seed, because peas infested with weevils only contain one-fifth of their proper contents. The seedsmen are now fumigating their peas, because their customers demand seeds that have been treated with bi-sulphide of carbon,—the method is very simple and should be universally adopted.

Mr. C. W. Nash said that peas should be treated at once after they are harvested, because a large proportion of the weevils emerge from the peas early in October and thus escape fumigation, if it is postponed to a later date. They may be found in immense numbers in barns where peas have been stored.

Prof. J. B. Smith asked whether the White-grubs referred to by Dr. Bethune were hairy or smooth. On being told that they were smooth and the larvæ of May-beetles (*Lachnosterna*), he said that at Washington a few years ago a lawn was so badly affected by White-grubs, which ate the roots of the grass, that the turf could be rolled up like a carpet; there the grubs were hairy and the larvæ of *Allorhina nitida* (a beetle which does not occur in Ontario).

In New Jersey they had had a similar experience to that in London with the Cottony Maple Scale,—the city of Plainfield last year was the worst affected and the numbers were similar to those described by Dr. Bethune. The large wintering scales of the female he had found abundantly parasitized. A Lady-bird beetle (*Hyperaspis*) was very numerous and attacked the scales,

while its larvæ devoured the eggs in the cottony masses. The parasites became more and more abundant as the season went on, and he had every confidence that there would be little or no trouble from this insect at Plainfield next year. His count of scales was similar, having found from 500 to 800 on a single leaf. Insecticides of various kinds had been tried, but he could find nothing that would kill the insects and not injure the foliage. He had, therefore, resorted to water from the city mains, and found that with a hose the eggs could be washed off the trees if applied when the cottony masses are opening early in May. This is a simple, easy and inexpensive remedy, and one that is ready at hand for every one who has a lawn and hose for watering it. If the scales are higher up than their usual position on the lower branches they can usually be reached with the assistance of a step-ladder.

Mr. C. W. Nash spoke of the damage done to asters and dahlias by the Tarnished Plant-bug (*Lygus pratensis*) and the trouble it gave to florists in Toronto; dusting with Pyrethrum insect powder was recommended as a remedy. He also referred to the prevalence of Hydrœcias (*Gortyna*) this year; he had found them boring into the roots and stalks of rhubarb, dahlias, Rudbeckia, burdock and in fact all plants that were capable of holding them; two species, *Gortyna nitela* and *cataphracta*, were especially abundant.

Dr. Fletcher drew attention to the good work being done by Mr. H. H. Lyman and other entomologists in Montreal in breeding and tracing out the life-histories of these moths. *G. nitela* was of use, as it destroys large numbers of Canada thistles and rag-weed.

THE "TUSSOCKS."

By The Rev. Thomas W. Fyles, D.C.L., F.L.S.

The common application "Tussock Moths," as applied to the perfect insects of the species *Orgyia antiqua*, Linneus, and *Orgyia leucostigma*, Smith and Abbot, (Fig. 7), is a misnomer. It is to the *caterpillars* of these species that the name "Tussock" is properly applied—they are conspicuously *tussocky*, or tufted, along the back, (Fig. 4). The generic name Notolophus given to these insects by Germar signifies this:—*Notos*—the back; *Lophos*—a crest. The male perfect insects of the two kinds have been very appropriately called "Vapourers," because of their airy and uncertain flight. They are known respectively as the "Brown Vapourer" and the "Grey Vapourer." The females of both species are incapable of flight, having only rudimentary wings.

The Greek generic name *Orgyia* was probably given because of the outstretched black pencils extending like arms from the shoulders of the larva. The feminine specific name, *antiqua*, from the Latin, appropriately denotes the grey and hunched form of the female moth. Linneus was often fanciful in his application of names!

The term *leucostigma* was given by Smith and Abbot to the Grey Vapourer on account of its white spots, (Fig. 3*e*); though the spots on Antiqua are more conspicuous than they, because of their darker setting.

The genus Orgyia belongs to the family *Liparidæ* which, in England, includes some very handsome, and also some very troublesome species. *Psilura monacha*, the "Black Arches," is a remarkably beautiful moth. *Porthetria dispar*, the "Gypsy Moth," is handsome, but its larvæ are destructive; whilst the larvæ of *Euproctis chrysorrhœa*, the "Brown-Moth"

are offensive, not only from their destructiveness, but also from the fact that their barbed hairs are easily cast, and, alighting on the human skin, work their way into its pores, and cause excessive irritation. In my early efforts at raising insects, in England, I again and again experienced the baneful effects of too close contact with these caterpillars.

The story of the introduction of the Brown-tail and Gypsy Moths to Massachusetts has been well told in the publications of Messrs. Fernald and Kirkland and Forbush; and so the evil reputation of these species has been widely spread. People in Canada have looked for their advent with apprehension. It is not to be wondered at, therefore, that when the egg-masses of an allied, but less injurious, species became conspicuous, *to expectant eyes*, something like a panic occurred—it was thought that the dreadful *Gypsy Moth* was come.

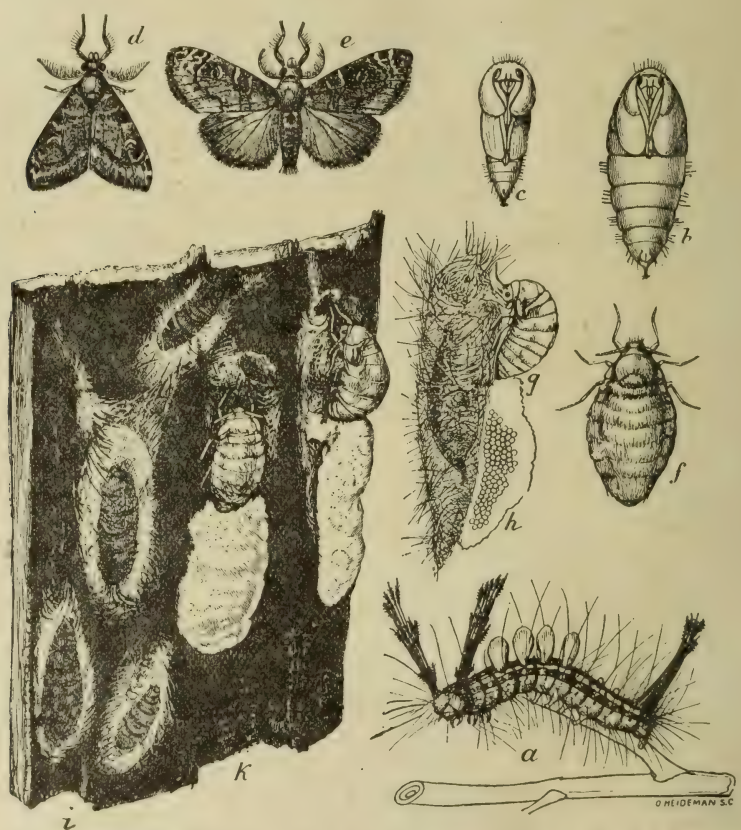


Fig. 7. Tussock moth : *a* caterpillar ; *b* and *c* chrysalids ; *d* and *e* male moths ; *f* and *g* female moths ; *h* eggs ; *i* male cocoons ; *k* female moths and egg-masses on cocoons.

I have known both the Brown Vapourer and the Grey for many years. The former, indeed, attracted my attention soon after my arrival in Canada; for it was to me an old acquaintance. Both species are common at Quebec. *Leucostigma* has been plentiful here for some years past—it has never done noteworthy damage. Its favourite food here is the White Willow (*Salix alba*, Linneus); and patches of its eggs may at this present time (October, 1905), be seen on the bolls of the willows in the Custom House Square, and along Mountain Hill.

I have always regarded the larvæ of *Antiqua* and *Leucostigma* as harmless and very beautiful objects—creatures to be admired. I certainly read with amused surprise the following paragraph in the "Montreal Daily Star" of July 22nd last:—

"It is now beyond question that in addition to the caterpillars being very destructive to vegetation, they are also poisonous to human beings. They can let themselves down from a tree by means of a silken thread, similar to that made by the spider. They seem especially to like to get down the back of one's neck, and they certainly do some painful work there."

What a thick skin a man must have who could let a caterpillar alight on his neck, and not brush it off immediately!

Still further to alarm the public, and to show "that our troubles have hardly commenced yet," the writer in the "Star" proceeds to describe the ravages of the *Gypsy Moth* in Massachusetts, and re-produces some of the illustrations from Forbush and Fernald's Report. There is a representation of the Dexter Elm with ten men engaged in freeing it from the eggs of the moth.

There, too, is a picture of the destroying of the eggs in a stone wall by means of cyclone burner.

Both of these are likely to excite apprehension, but are hardly fair to the Tussocks, who were not the guilty parties in the case. "Give a dog a bad name and hang him!"

We remember the "Kissing Bug Scare," in which kissing-bugs multiplied to such an extent that it was hard to believe that any damsel could go unkissed.

In this Tussock Moth Scare, whatever damage has been done to trees, the Tussocks—in popular opinion—have been the doers of it. One man told that the gooseberry bushes in the gardens near him had been defoliated —of course the Tussocks had done the harm, and not *Eufitchia ribearia*, nor *Nematus ventricosus*. The larvæ of *Vanessa Antiopa*, *Clisiocampa disstria*, *Hibernia tiliaria*, *Hyphantria textor*, and others, always do their share towards denuding the trees; but for injuries done by these the Tussocks are now held blame-worthy.

To show how easily a mistake might arise:—A person at Quebec, on the look-out for damage by the Tussocks, would notice that the Ash-trees, which formerly were such graceful adornments to the public squares and gardens of the city, were leafless, dead, or dying. "Oh," he would be likely to exclaim, "the terrible Tussock Moths!" But the Tussocks were entirely blameless in this case. My attention was directed to the trees, in the spring of 1904, by Mr. Joly de Lotbinière. I examined them carefully, and could find no trace of injurious insects. I came to the conclusion that the death of so many of these beautiful trees was occasioned by the excessive drought of the preceding spring.

I had recorded that on the 11th of April, 1903, and again on the 12th, the thermometer in my yard indicated 82 degrees in the shade. The untimely heat was followed by a long, cold, and exceedingly dry time. Prayers for rain were offered in some of our churches.

In the end of May and beginning of June, the air was thick with smoke from forest fires. On the 3rd of June the smoke was so dense that the river steamboat "Frontenac" was unable to run.

I am convinced that the young foliage of the ash trees was so affected by these circumstances that it performed its functions imperfectly. Then, too, the earth was so parched that the roots of the trees must have failed

to extract nutriment from it—the Ash is a tree that requires much moisture! The unfavourable summer was followed by a very severe winter.

To these consecutive circumstances I ascribe the loss of so many of our Ash trees, and not to insect depredations.*

The two Canadian species of Orgyia may be easily distinguished in every stage of their existence.

The eggs of *Antiqua* resemble a cluster of whitey-brown beads; those of *Leucostigma* to a dab of cake-frosting.

The larva of *Antiqua* has a *black* head; that of *Leucostigma* has a *red* one.

The difference in the moths has already been sufficiently shown.

It is impossible that the Tussocks can ever be as destructive as the Gypsy Moth has proved itself. Their females have no wings—they lay their eggs on the cocoons from which they crept. So the advance of the species is slow, and is made by the caterpillars. But the female Gypsy Moth has ample wings; and, though it is heavy with its burden of eggs, it can, and does, take flight for other localities. Its caterpillar, moreover, attains a much greater size, and is more voracious than either of our Tussock larvæ.

The close of the autumn is undoubtedly the season for reducing the numbers of *Orgyia antiqua* and *Orgyia leucostigma*. The egg-clusters of both species may be easily peeled from the trees with the thumb and finger. They should then be thrown into the fire. So the numbers of the creatures can be kept down with ease and without cruelty.

THE TUSSOCK MOTH SITUATION IN MONTREAL.

By Henry H. Lyman, M.A., Montreal, Que.

Until Montreal was visited early last spring by a gentleman from Lincoln Park, Chicago, we hardly knew that we had a Tussock Moth situation in our city. Those of us who know about such things, of course, knew that we had the Tussock Moth, that, like the poor, it was always with us and always likely to be with us. But this gentleman, seeing a good many egg masses on trees, sounded the alarm, and addressed a letter of warning to the President of the Natural History Society, who happened to be a Professor of Botany.

The newspapers took the matter up, and one especially devoted much space and energy to a sensational account of the "arrival" of this much dreaded pest, and, evidently confusing it with the Gypsy Moth, told of the millions which had been spent in the United States in fighting it.

A meeting of the Natural History Society was called to consider the situation, to which the public were invited, and about twenty, all told, responded—the Dominion Entomologist being present to throw light on the subject.

After considerable discussion, a Tussock Moth Committee was appointed which later waited upon the Finance Committee and asked for a grant to be used in fighting the pest. The Committee voted the munificent sum of $100 for this purpose. The Society then offered a bounty of 25c. per hundred for the egg masses (Fig. 7*k*), and the school children began to collect them, and much good was anticipated, as the amount voted would have paid bounties

*The trees were cut down this fall (1905). The wood was found to be perfectly sound—quite free from borers.

on 40,000 egg masses, but the Parks and Ferries Committee of the city council took alarm. Here were no less than one hundred good dollars slipping through their fingers to a purely disinterested society, and being honestly expended for the good of the city without the slightest chance of patronage on their part—which was, of course, intolerable. So they demanded the money, and took over the campaign themselves, withdrawing the bounty, and, instead, putting men to work with poles with tin triangles on the ends to scrape the cocoons off the trees and let them lie where they fell.

A certain amount of scraping was, of course, done, but I doubt if we got more than $50.00 worth for the $100.00 expended. The work was begun late, and done much too leisurely, and had it not been that the eggs were unusually late in hatching, would have been even less effective than it was.

In spite, however, of the inefficiency of the work, no very serious damage resulted. A few isolated trees were stripped of their leaves, and a good many trees had at least a part of their foliage rendered pretty ragged, but a very large number of trees were hardly affected at all.

In the grounds about the house where I live there are many trees—silver maples, elms, horse chestnut, butternut, black cherry—and a careful search early in the season only resulted in my finding two egg masses and one female cocoon from which the imago had never emerged. This was removed from the tree and placed in a glass-bottomed pill box, and later there emerged from it over a hundred parasites which, on being submitted to Dr. Ashmead, were pronounced *Diglochis omnivora*, Walker, which I was informed was not previously known to be a parasite of *Orgyia Leucostigma*.

Before the time for the eggs to hatch, I selected a few cocoons with typical egg masses, and immersed them for about ten minutes in gasoline, which I thought would kill the eggs, intending later to place one of them with an inflated larva with the moths in my collection. Fortunately, I did not do so at the time, as I found later that many of the larvæ had hatched, though perhaps some of the eggs were killed by the gasoline bath.

As the caterpillars of the Tussock moth matured and the damage to the trees became quite evident, the city fathers took alarm for fear there might be a second brood which would be much more destructive than the first, but they were assured by the official entomologist that there was no danger of that. There must, nevertheless, have been a few eggs which hatched, as Mr. Winn reported seeing a few days ago nearly mature larvæ crawling around, and a newly emerged female ovipositing. The numbers were, however, too insignificant to cause any further appreciable damage.

A Bank manager, knowing the nature of my business, applied to me for a "prescription" to clear out the pest from his trees, but when I told him that it was never possible to exterminate an insect pest, that all we could do was to control it, and recommended careful, hard and continuous work in removing the egg masses from his trees, I am afraid that he thought that there was not much good in entomology.

The Parks and Ferries Committee decided to apply to the Finance Committee for a grant of $500.00 for further work in removing the egg masses this autumn, but I have learned from the Secretary of the former committee that only $200.00 was granted, and that this wholly insufficient grant has been nearly all expended.

In this matter, however, I think we are likely to derive nearly as much benefit from the action of natural causes as from the efforts of man. Probably owing to the frequent rains, bacterial disease broke out among the caterpillars when approaching maturity, and many were seen hanging limp and rotten from this cause.

Of a number of cocoons which I gathered for Dr. Fletcher many were found to be putrid, and I have seen many cocoons, apparently of females, from which the moths had evidently not emerged.

In view of the preparation of this paper I devoted a few hours recently to a necessarily rapid and very cursory examination of the shade trees in some of the principal uptown streets and squares, as well as making inquiries among my entomological friends. I ascertained that on one street a horse-chestnut in a garden had been quite stripped, but that it had leafed out again and had even blossomed a second time. I examined it, and found that it was an old and decrepit tree. In the same garden there is a specimen of what used to be called *Negundo Aceroides*, but now *Acer Negundo*, L. (the Ash-leaved Maple), which had also been stripped, but a few yards further up on the opposite side of the street were Horse-chestnuts and Ash-leaved maples which had practically not suffered at all.

We have very few Horse-chestnuts in Montreal, and practically none on the streets, nearly all the trees set out in the streets being maples and elms. But Acer Negundo, where attacked, seemed to suffer more than any other tree. The examination I made disclosed only a few trees very seriously infested, but very many trees were found which had a few egg masses upon them.

A few egg masses were found on telegraph poles, and, as I suggested to Dr. Fletcher, if the caterpillars could be induced to eat them they would be the greatest possible blessing to our city.

It is greatly to be deplored that the Finance Committee voted so inadequate an amount, as had the full $500.00 been granted a great deal more work could have been done, and as the species has only been increasing slowly of recent years, if all the egg masses which could be found were destroyed, it would probably be years before any further expense would have to be incurred; but doing the work in only a half-hearted way will necessitate its being done every year if our shade trees are to be protected from damage.

No depredations by this pest were perceptible in the district surrounding Montreal, and the damage to the shade trees in the city is, doubtless, to be attributed to the greater immunity of the caterpillars from their natural bird and insect enemies.

ENTOMOLOGICAL CONDITIONS IN NORTH CAROLINA.

By Franklin Sherman, Jr., Professor of Entomology and Zoology, O.A.C., Guelph.

North Carolina is a State of approximately the same area as "Old Ontario," approximately the same length, and approximately the same population, and lies directly south of Old Ontario, Ottawa being almost precisely north of Cape Hatteras, and Windsor north of Murphy, the western-most county seat. At its eastern end the State is some 150 miles broad, across the middle something like 100 miles, and tapers to a dull point at the south-western extremity. In fact, the State is somewhat slipper-shaped.

The population is more evenly distributed than in Old Ontario, there being no large region so thinly settled as the northern section of our province, and no large region so thickly settled as the southern section. There are no large cities, Wilmington, the largest, having but 25,000 population, and Raleigh, the capital, having 13,000, almost exactly the size of Guelph. From these facts it is easy to conclude (and rightly) that agriculture is the chief

occupation in all parts of the state, far out-ranking all other industries combined in the amount invested and in returns. The abolition of slavery forty years ago left these people poor, and many of the large plantations were abandoned, while, as a rule, the farms are still too large to be cultivated to best advantage. An abundance of cheap, inefficient and generally ignorant labor, and a scarcity of intelligent and reliable help, has had a very detrimental effect. In all parts of the state, especially east of the mountains, may be seen abandoned farm lands, and occupied lands which are poorly cared for. These facts all influence the entomological conditions prevailing.

Geologically, the state is very distinctly divided into three great regions:—*1st*, the Eastern, or coastal plain region, extending from the coast to about 100 miles inland to an elevation of 300 feet. *2nd*, the Middle, or piedmont region, extending from the coastal plains region to the foot of the mountains, a belt some 150 miles in width, ranging from 300 to 1,000 feet elevation. *3rd*, the Western, or mountain region extending from the Blue Ridge mountains to the Great Smokies which form the western boundary of the state. Elevation ranges from 1,000 to 6,700 feet. The Blue Ridge is the water-shed, and the fauna and flora of the mountain region partakes to some degree of the nature of the Mississippi valley, though the Great Smoky Range cuts off many of the typical and more southern forms. I shall only mention such insects as are of interest as showing distribution, variation in habits, remedies, etc.

The Eastern Region.

This portion lies principally in what is biologically known as the humid area of the Lower Austral Zone, a zone not at all represented in Ontario. The soil is for the most part sandy, or a black muck or peat. The crops are corn, cotton, peanuts, sorghum, a little rice along the coast, potatoes (both Irish and Sweet), and garden truck for early shipment to northern markets.

Insects of Staple Crops. The Black Grain weevil, *Calandra oryzae*, occurs abundantly throughout this region. Carbon bi-sulphide is the remedy recommended, and is satisfactory when properly applied. The Corn Bill beetle, *Sphenophorus sculptilis*, is destructive to young corn on low lands, especially those subject to overflow. They are worse on lands just from rice sod, and the avoidance of such lands is the only satisfactory method of averting injury. During the last two seasons there have been serious outbreaks of the Sugar-cane Beetle, *Ligyrus rugiceps*, although this is typically a pest of the cane plantations along the Gulf of Mexico. A satisfactory remedy for this insect is yet to be devised. Late planting was the only expedient which proved worthy of notice. The Corn Stalk-borer, *Diatraea saccharalis*, (Lepidoptera) is also destructive throughout this area, while the Ear-worm, *Heliothis armigera*, (Lep.) I have seen destroy whole fields of sweet corn, every ear containing from one to twelve of the voracious larvæ. This latter insect is also frequently guilty of boring into the bolls of cotton, and of recent years, since there has been so much discussion of the Boll-weevil, farmers often mistake it for this pest. The peanut has no serious insect pest to my knowledge.

Insects of Garden Crops. Throughout most of this region the Potato-beetle, *Doryphora 10-lineata*, is abundant and destructive, though, curiously enough, I had a report from one isolated locality that it appeared there in numbers for the first time in 1901. It can hardly be said that spraying is a common practice even in combatting this pest, as labor is generally so ignorant throughout this region that pumps would be rapidly broken, and the work would be poorly done. Hand-picking is, therefore, much relied upon

even at this late day. Paris green mixed with lime or land plaster is also widely used as a dust application. It is only within the last year that I heard of three field sprayers, spraing four rows at a time, being purchased in this section, although the growing of Irish potatoes is a leading industry in many localities. Some few of the growers have knapsack pumps, but the universal complaint is that hands are not to be had who will honestly and carefully do a day's work with them.

The Harlequin Cabbage Bug, *Murgantia histrionica*, (Fig. 8), while common enough in all the state east of the mountains, is much more abundant here than further west. It is one of the Stink-bug family (Pentatomidae), and is a destructive enemy of cruciferous crops, especially cabbage and collards in this region. Hand-picking and late planting are the principal remedies.

Fig. 8. Harlequin cabbage bug.

In the strawberry section the Strawberry Weevil, *Anthonomus signatus*, is the most important enemy. So far as I have been able to learn this is the southern-most region for this pest on the Atlantic seaboard, but surely it is very destructive here. It lays its egg within the bud and then cuts the pedicel. The staminate varieties are chiefly attacked, and by the use of a large proportion of pistillate varieties the growers are able to secure the greatest degree of immunity. The insect also breeds in abundance on the blackberries (*Rubus sp.*), which grow wild in that region, and the use of fire to burn out these vines as well as to run over the berry fields as soon as picking is over, is coming into favor, as many of the developing larvæ, pupae, and fresh adults are still in the fields after the last of the crop is removed.

Insects of Orchard Fruits. The *Codling Moth* is abundant and destructive in this section, good crops of apples being a thing almost unknown in recent years. Within the last few years, however, spraying is becoming more popular in the orchards, especially as these are generally small and the owners in many cases do their work with their own hands. The *Plum Curculio* throughout this region is as destructive to the peach as to the plum. The jarring method is being widely used in commercial orchards, as it is a purely mechanical process which can be done by even the most ignorant laborers, for even they can soon be taught to recognize the adult beetle. The largest peach and plum section is in the western part of the Eastern Region, at Southern Pines. Here the *San Jose Scale* has been well known for the last ten years, yet I know of many thousands of trees which have been known to be more or less infested for eight years, and which this year brought forth the sixth consecutive profitable crop, a tribute to the efficacy of careful, persistent spraying. In these orchards oils and soaps were relied upon until about three years ago, since which time the Lime-Sulphur-Salt wash has held sway. One large orchard has been treated principally by the fumigation method, and is in excellent condition, and the owners are now undecided whether it will be better to renew their outfit of tents or resort to the wash. I think that the tendency is, and will continue to be, to avoid the use of self-cooked mixtures or chemical substitutes, and use only the wash made of lime, sulphur *and salt*, boiled with artificial heat for not less than one hour. In this particular region white labor is quite obtainable, hence conditions are more favorable for the use of such washes as require care in their preparation and

use. The experience there has been that the best time to apply the wash is as late in winter or early spring as possible, just so the work is completed before the buds actually open, the advantage of this being that the coating adheres through a large part of the summer, and renders it difficult for the young to obtain a foot-hold. One thorough, annual treatment has been found sufficient, two or more being necessary only when trees have been neglected, or the scale not discovered until badly encrusted. By making the treatment late the growers also secure much fungicidal effect, so much so that many will hereafter use a late treatment for the scale, and also for its effect on fungi, thus taking the place of the usual late winter treatment with the Bordeaux Mixture. Indeed, from the present outlook it seems not unlikely that in many apple and pear orchards the scheme of spraying will eventually be as follows:—

1st. Just before buds burst with Lime-sulphur-salt.
2nd. Just after blooms fall with Bordeaux and Paris green.
3rd. Ten days later with Bordeaux and Paris green.

The southern method of jarring for the *Curculio* also deserves notice. Two men are engaged in the work of jarring a tree, each being provided with a semi-circular frame or screen large enough so that the two will include all the space directly beneath the branches. The two men walk rapidly along the rows, one on each side, and, bringing the screens together under each tree, a few quick, hard blows are given with a padded club. After some ten to thirty trees have been jarred in this way the screens are lowered to the ground and the jarring carefully searched for adult Curculios, which are crushed in the fingers. The method is quite rapid, two men having been observed to jar and kill the insects from 24 trees in 6 minutes. In the large commercial orchards this method is almost universal, and they find that the beetles appear first along the edges of the orchard, indicating that they hibernate in woods or fields, but I have never yet taken one of the insects in hibernating quarters. The growers make an effort to have each tree jarred at least twice a week, but still they prefer to give more attention to the outside rows, hence the trees bordering woods may sometimes be treated four or five times in the week while those in the interior may be jarred only once or twice.

Among insects not of economic importance this region is notable for a strong infusion of southern forms. Several times we sent insects to the National Museum at Washington representing species which they reported belong typically to the Florida fauna. The Orange-dog butterfly, *Papilio thoas* which has of recent years been taken even in Southern Ontario, is common in eastern North Carolina near the coast, though many years of careful collecting has failed to reveal it at Raleigh, about 120 miles inland. Here the handsome skipper, *Eudamus proteus*, is also found, and less than a month ago this species was taken at Raleigh for the first time. The swallowtail *Papilio palamedes* is also abundant through the summer near the coast. Among the Pierids, I think that *Pieris monuste* occurs, though this opinion is based only on a brief glimpse of a specimen taken to be this species on one of the low, sandy islands along the coast. The dragon-flies, *Libellula* and *Calopteryx sp.*, are also found here.

The Middle Region.

This region lies about equally in the lower austral and upper austral zones. The typical soil is a red clay, but this varies to yellowish clay mingled with much sand and gravel in the east. The crops are corn, tobacco in the north, wheat in the middle, and cotton in the southern areas.

As the upper austral zone includes the southern tier of counties in Ontario, many of the insects of this region are well known in this province. The *Chinch Bug* is rarely reported in North Carolina from either the eastern or the western sections, but it is a standard pest in the middle section. Spraying with kerosene emulsion at a strength of 10 to 15 per cent. oil has been practised in a few instances but only with more or less injury to the crops, and our recommendation was to rely principally upon the well-known plowing methods, and our farmers were surprised to see how effectual even a single, deep, furrow was.

The Hessian Fly is another pest which is practically confined to this region, probably mainly because very little wheat is grown in the other sections. At any rate it is here a very destructive insect in the best wheat section of the state. Late planting is the preventative usually employed, and careful inquiry brought out the fact that from October 15th to November 1st is the safest time to sow to avoid fly and at the same time escape the injurious effects of winter freezing. Wheat is frequently sown as late as the last week in November, and I have been told of seeding in Xmas. week.

Fig. 9. Euptoieta claudia.

Fig. 10. Junonia cænia.

There are but few insects which I could name as distinctive of this region. One of the most characteristic butterflies is *Euptoieta claudia* (Fig. 9), the larvæ of which are everywhere common on the May-pop or Passion-flower. Another is the Buckeye, *Junonia coenia* (Fig. 10). Both of these butterflies are almost too southern in range to be expected in Ontario, though I suspect, without having inquired, that they are occasional in the southern counties.

[They have been taken, though rarely, in the Counties bordering on Lake Erie.—Ed.]

The Western Region.

This region is characterized by high plateaus and mountain ranges. It lies in the Transition and the Boreal life-zones. The Transition includes all of Old Ontario between the northern and southern tiers of counties, and the Boreal includes practically all of New Ontario and the great region about James Bay. Of course the more northern animals and plants of these regions are not represented in North Carolina, but one would be surprised at the similarity of the mountain plateau region and the country right here at Guelph. Cattle-grazing is one of the chief agricultural occupations, while hay, potatoes, oats, and apples are also standard crops. This is the only region where currants, raspberries, and rhubarb can really be said to be a success. Here, too, one finds many of the typical Ontario insects and insect pests. The currant bushes are regularly attacked by the currant worm, and the apple trees by the Oyster-shell scale, which is only known to me in this state in the mountain and west-central parts of the state. In

the steep mountain orchards the dust-spray is being experimented with. As one apple-grower in this region has something over 30,000 trees now coming into bearing, the cheapest, efficient means of spraying the trees becomes an important question. *The Scurfy Scale* is more abundant here than elsewhere in the state.

Among the insects not of economic importance a specialist in lepidoptera could, doubtless, name many species well known to our most active collectors. Among the butterflies may be mentioned such forms as *Argynnis aphrodite*, *A. diana*, *A. cybele*, *Brenthis myrina*, *Grapta faunus*, *G. comma*, and *G. j-album*. I had threatened to capture *Basilarchia arthemis*, and *Vanessa milberti*, and even cherished a fond hope of finding a stranded colony of *Chionobas* on one of the high mountains, but further exploitation of this interesting region must now be left to others. But it is extremely interesting, as showing how mixed are the faunas in these southern mountains, to point out that in the extreme southwest corner of the state *Papilio thoas* (Fig. 11), and the Gulf Fritillary, *Agraulis vanillæ*, both appear to be somewhat common.

General Observations.

A more interesting territory for the entomologist can scarcely be found than North Carolina. Most of the collectors of insects are in the north, and when these collectors have gone south at all they have gone through to Florida, Georgia, Louisiana or Texas. Consequently there is a great strip of middle ground which has never been at all adequately explored. Even in economic entomology nothing definite has been attempted previous to the opening of this new century. The entomologist in this state is, therefore, met by persons of every conceivable attitude toward his work, some incredulous, some interested, some contemptuous, and some indifferent. The farming classes, as a whole, however, have in recent years been brought to see the importance of this work. The wide spread of the San Jose Scale, the threatening danger of the cotton Boll-weevil, and the almost total destruction of fruit crops by the Codling Moth and Curculio in the eastern section, have brought them to a realization of its true meaning.

For the five years that the writer was located in North Carolina, he, his assistants, and a Mr. Brimley, at Raleigh, were the only active collectors known to be residing in the state. Within the last few months another collector, a native of Connecticut, was discovered. Now there are two or three school teachers who are doing a little work along this line, though in a very primitive way. Altogether, the state is, as yet, practically unexplored, entomologically.

While spraying is gradually coming into vogue, the pumps are, as a rule, cheaper and more inefficient than those in use in the north. In order to get the practice started at all it has been necessary to begin at first in the simplest manner possible. But the poverty of the farming classes in past years, and the unreliability of the labor, would in any case have rendered the more expensive machines impossible. In the largest peach and plum section, where the San Jose Scale is generally distributed, barrel pumps with two leads of hose, each with a single nozzle, are principally used. Large tanks and heavy machinery could not be used here on account of the very sandy nature of the soil, through which the wheels readily sink so that heavy loads are impossible.

The generally prosperous years of recent times, and the development of enormous fruit and trucking industries throughout the south to supply the large and expanding northern markets, is giving cause for more demand for

information, about insect pests and methods of combatting them, and at the present time more places are open for the employment of economic entomologists in the south than any other section, so far as the writer is aware, while it goes without saying that in regard to life histories, broods, hibernation, etc., much more remains to be discovered there than in the more northern states.

Fig. 11. Papilio thoas, the Giant Swallow-tail Butterfly. Colours black and yellow.

In the discussion that followed the reading of this paper, the first insect that was commented upon was PLUM CURCULIO (*Conotrachelus nenuphar*).

Dr. Fletcher spoke in high terms of appreciation of Prof. Sherman's paper, and congratulated the Society upon the addition to its members of so able and enthusiastic an entomologist. He remarked that the Plum Curculio in Canada was kept in check almost entirely by spraying, and that jarring was rarely resorted to.

Mr. GEORGE E. FISHER had tried both methods, but preferred spraying, as it proved more effective, and had the additional advantage that a fungicide could be used with the Paris green, and thus a double result was accomplished. Mr. Willard, of Geneva, N.Y., whom he had visited, depended entirely upon jarring for the protection of his plum trees. He uses the wheelbarrow system, and employs twelve men, each with a barrow, for the purpose. As the Curculios are very susceptible to cold, the jarring is done in the early morning when they are sluggish and have a less firm grasp on their resting place. As many as a hundred of the beetles were often shaken from one tree. There was undoubtedly one advantage in jarring,—you killed the beetle for certain, whereas in spraying you only distributed poison for the insect to eat and could not be sure that he would partake of it.

Dr. FLETCHER said that the cost of the labour required for jarring was very much greater than for spraying. Good paying results were obtained by the use of the latter method, and, as Mr. Fisher had stated, there was the

great additional benefit derived from the addition of Bordeaux mixture to the Paris green or arsenate of lead. For his part, he much preferred to use, and always recommended to others, Paris green rather than the arsenate, as its conspicuous color prevented any danger of its being mistaken for anything else.

San Jose Scale.

Mr. G. E. Fisher, in the discussion on Prof. Sherman's paper, referred to the methods of dealing with the San Jose Scale, and first to the use of the lime, salt and sulphur mixture. He preferred to dispense with the salt as it corrodes the pumps, and in his experience the mixture destroyed the scale better without it. He used a heavy wash of the mixture, employing one pound of lime to half a pound of sulphur in each gallon of wash. It should be cooked *for two hours*, not for one only, as was the common practice. He made use of the steam from a threshing engine for the purpose, and cooked twelve barrels at a time, in order to have an abundant supply both for himself and his neighbours. The test of the boiling was that the mixture should finally turn green.

The results were most satisfactory. An orchard of one hundred trees of all sorts, badly infested with the scale, was treated three or four years ago with the wash made in the manner just mentioned and was sprayed thoroughly; no scales have been found there since. The wash should be applied by the middle of April, not later; he had found it safer to do the work from the middle of March to the middle of April, if later injury was done to the opening buds.

Prof. Sherman expressed the opinion that it was best to apply the wash as late as was safe, as he found that it stuck to the trees better and did good work for a longer time. His mixture consisted of 20 lbs. of lime, 17 lbs. of sulphur and 10 lbs. of salt to each 50 gallons. In an orchard containing 20,000 peach trees the wash had been tried both with and without the salt, and the results when the salt was included were much better than without it. The boiling was done for at least one hour and the spray was applied while hot. The advantage from the salt was that it made the wash stick better.

Prof. Lochhead read the following paper in which he gave an account of his recent experiments in treatment for the scale.

EXPERIMENTS AGAINST THE SAN JOSE SCALE IN 1905.

By Wm. Lochhead, Professor of Botany, Ontario Agricultural College, Guelph.

During the eight years that the San Jose Scale has been in Ontario many remedies have been devised and applied for its extermination. Among the early remedies were whale oil soap, kerosene and kerosene emulsion, potash solution, soda solution, and dilute crude petroleum. All of these were only partially successful. The whale oil soap was a most effective destroyer of scale and a tonic for the tree, but was too expensive for the ordinary fruit-grower to use. The potash and soda solutions were not sufficiently effective against the scale to make them favorite remedies. Kerosene, either pure or dilute, was too unsafe, and was soon discarded. The kerosene emulsion, although quite effective in controlling the moving larvæ, was not at all

adapted as a remedy for the scale under other conditions, and hence was abandoned. During the last few years new remedies have appeared and have been remarkably successful. Probably the most effective of these is the lime-sulphur wash. Various combinations of this wash have been tried, in order to determine the most satisfactory remedy for the scale, from the standpoint of both effectiveness and cheapness.

The following are the formulæ which have been usually adopted in Ontario for the preparation of these different combinations of the lime-sulphur wash:

The Lime-Sulphur Wash (fire or steam boiled):

Fresh lime	20 pounds.
Sulphur (flowers)	15 pounds.
Water	40 gallons.

With warm water make the sulphur into a paste; put in the lime and add about 15 gallons of warm water with stirring. The sulphur made into a paste may be added after the lime has been slaked. Boil for an hour and a half in a kettle or in a barrel with live steam. Make up to 40 gallons with hot water; strain into spray tank and apply while warm.

Some of our fruit-growers obtained excellent results by using larger proportions of lime and sulphur to the barrel, namely, 35 of lime and 20 sulsulphur; 25 lime and 20 of sulphur. The time given to the cooking of the lime-sulphur wash is quite different in different localities, and even by fruit-growers in the same localities. In some cases the wash is boiled for an hour and a half to two hours, in other cases it is boiled for one hour, and many state that they have obtained good results by boiling for only one-half hour.

Lime-sulphur Wash (self-cooked):

Formula No. 1 Recommended by Mr. A. N. Brown, Wyoming, Delaware.

35 pounds of best stone lime.
17 pounds flowers of sulphur.
40 gallons water.

(1) Put the 17 pounds of sulphur into a vessel, add two gallons boiling water, a little at a time, stirring vigorously all the while until a fine paste is obtained.

(2) Put the 35 pounds of lime in another vessel, large enough to hold 40 gallons, pour into this lime 12 gallons boiling water; now add the sulphur paste previously prepared. Very quickly cover the barrel with a heavy burlap sack, having placed an old hoe into it first; now allow it to cook for 30 minutes. Do not stir, as that reduces the heat by letting in cold air, but with the hoe raise it from the bottom occasionally so that it does not run together and burn before the lime is thoroughly slaked. Nothing must be done to interrupt the cooking process, as that would affect the final quality of the wash.

(3) After this mixture has cooked 30 minutes, add 28 gallons of warm water, not necessarily boiling. Strain into the spray tank, and apply while warm, as in this condition it will flow through the spray pump nozzles more easily than when the wash gets cold. It will also remain in solution much more thoroughly when it is warm than when it cools.

Formula No. 2.

25 pounds good stone lime.
20 pounds flowers of sulphur.
12½ pounds sal soda.
40 gallons water.

Put 5 or 6 gallons of hot water in a wooden barrel, add the lime, quickly following with the sulphur and sal soda, and stir until the slaking is practically completed. It may be necessary to add a little cold water at intervals to keep the mixture from boiling over. After the violent action has ceased, cover the barrel to retain the heat and allow it to stand 15 to 30 minutes, dilute to the full quantity and apply.

Formula No. 3. (Geneva formula).

30 pounds of good stone lime.
15 pounds of flowers of sulphur.
4-6 pounds of caustic soda.
40 gallons of water.

In preparing the wash, the lime was started to slake with six gallons of water, and while slaking, the sulphur, which had just previously been made into a thin paste with hot water, was added and thoroughly mixed in with the slaking lime. To prolong the boiling of the wash, the caustic soda was then added with water as needed, and the whole mixture was kept thoroughly stirred. As soon as the chemical action had ceased the required amount of water was added, when the mixture was ready to use. Aside from the heating of the water, the cooking of the wash was done in a tub or barrel, and took from ten to twelve minutes. In some preparations, especially when hot water was used to start the slaking of the lime, not all of the stated amount of caustic soda was employed, but six pounds was the minimum.

Dr. Felt, New York State Entomologist, writing under date of Oct. 30th this year, advocates the employment of a lime-sulphur wash composed of 20 pounds of lime, 15 pounds of sulphur, and 40 gallons of water, bringing about the combination either by using 10 or 12 pounds of sal soda and starting the action by hot water in a barrel, or by boiling for at least 30 minutes.

It will be noted that salt has not been used in the preparation of any of these mixtures. In the preliminary experiments carried out three years ago by Mr. G. E. Fisher, he came to the conclusion that the presence of the salt added to the expense, made the wash more difficult to spray, and increased its corrosive action on the metal parts of the pump; while it failed to be any more effective as a destroyer of scale, or more adhesive to the bark of the tree. Whether these conclusions will be borne out by future experiments remains to be seen, but some observations made this year show that probably the presence of the salt is beneficial, and it would be advisable to conduct experiments this coming season to test this very point.

My observations this season would, I think, incline me to believe that the presence of salt renders the wash more adhesive, and hence more effective. I found, as a rule, that in those orchards where the mixture adhered longest and best to the bark the scale had made but little progress.

It would appear that the *adhesiveness* of the wash is a large factor in its *effectiveness*. The tremendous reproduction of the scale that occurs in September and October can hardly be checked, or the spread prevented, unless the bark has a coating which is either distasteful or harmful to the crawling larvæ. For this very reason that the bark is made clean and enticing to the larvæ during the last months of the growing season, other remedies fail to keep the scale in check, when only one application was made and that application in the spring just before the buds opened.

As to the results of the season's experiments with lime-sulphur, it may be stated in a general way that little or no difference could be observed between the effectiveness of the cooked and uncooked washes. Some orchards that had been treated with the cooked wash showed more scale at the end of the season than at the beginning, and the same results were observed in

some orchards treated with the uncooked wash. On the other hand, it should be stated that both washes gave good results in many orchards. The reason for this variation in results is difficult to find; for example, Mr. W. H. Bunting of St. Catharines, who did not check the development of the scale with the cooked wash, is a most careful and thorough sprayer. On examination of Mr. Bunting's plum, peach, pear, and apple orchard in late October, Mr. P. W. Hodgetts and myself found the scale more abundant and more wide spread than at the close of any previous season. Like results were observed in Mr. Bunting's orchard at his home in St. Catharines. The scale had spread and partly encrusted many trees in spite of treatment with the cooked wash in the spring.

Mr. Titterington's orchard composed of peach and plum chiefly, just across the Welland Canal, was sprayed also in the spring with the cooked lime-sulphur wash. The trees near the road at the south end were fairly free from scale, but many trees at the north end were quite badly infested.

Mr. Irvine, near Queenston, on the Queenston Road, used the cooked lime-sulphur wash prepared according to the usual formula. The results might be said to be good in spite of the fact that there is now a sprinkling of scale in his peach orchard. Many of his Japan plums and a few of his peach trees, however, are badly infested. Mr. Muir, of Virgil, also sprayed with the cooked wash and speaks very highly of its merits. Certainly the condition of his trees at the end of October would seem to justify his opinion, for there was but a slight scattering of scale. This is saying a good deal when we remember that the scale is very bad throughout the Virgil district. In Mr. Muir's orchard the wash on the bark was quite visible in most of the trees up to the end of the season.

Mr. Lambert's orchard near the Welland Canal was sprayed thoroughly in early spring with the cooked lime-sulphur-salt wash. Two rows of Japan plums, badly encrusted last season, were in good condition, and the scale was not abundant. These trees showed very plainly the wash at the end of the season, and were perhaps the best in this regard of all the trees we examined. To my mind the presence of the salt made the wash more adhesive than that applied by his neighbors; moreover, it is very likely due to the extra adhesiveness of this wash that the scale was so reduced in numbers.

In the peach orchards of Mr. Porter Adams, on the Queenston road, near Queenston, the uncooked lime-sulphur wash was used. The results were good, although there was a slight sprinkling of scale throughout his orchard. Untreated trees were very bad, the bark being wholly encrusted. An interesting observation in this orchard is worth recording. There were three, and only three so far as we could find, badly injured peach trees in the sprayed orchard, and these were not close to one another. These received the same application as the other trees, but they are now encrusted with scale.

Mr. Bradley, near Mr. Adams, was not so successful with the uncooked wash. We are told, however, that the trees received a one-sided application on account of the high winds that prevailed at the time of spraying. The older trees of this orchard are now badly infested.

Mr. C. A. Secord used the uncooked lime-sulphur wash in his fine 16-acre peach orchard, and secured excellent results. Scale was there, but it was rather hard to find. The owner is perfectly satisfied with the results, and will use a similar wash next spring.

Mr. Beattie, Scale Inspector, of St. Catharines, tried Scalecide, Carlson's Mixture, and the uncooked lime-sulphur wash in his own orchard.

After examination of the trees we concluded that the last wash gave the best results, although scale was plentiful on all his trees in October, at the time of our visit.

As part of the experimental work for 1905, in addition to the lime-sulphur washes, Mr. P. W. Hodgetts and myself tried some new mixtures which had been advocated, viz., *Carlson's Mixture*, and *Pratt's Scalecide*.

In the peach orchard of the Industrial Home near St. Catharines, Carlson's Mixture, kerosene-flour, and uncooked lime-sulphur were used. The first two did not give satisfactory results, for scales were very abundant on trees treated by these mixtures; the last, viz., the uncooked lime-sulphur, in our opinion, did its work well, for scales were very scarce on trees treated by it. Here again, the wash was quite evident on the bark to the end of the season. The condition of these trees is remarkable when we bear in mind that across the fence is an untreated peach orchard which is terribly encrusted and rapidly dying. The few trees left untreated as checks are now very badly encrusted.

As I have already stated neither Scalecide nor Carlson's Mixture gave as good results in Mr. Beattie's orchard as the uncooked lime-sulphur. It appeared to us that in this orchard Carlson gave better results than Scalecide.

Carlson's Mixture and the kerosene-flour emulsion were also tried in a peach orchard belonging to Jas. Hutchison, near Virgil, the bulk of the orchard, however, remaining untreated. Results were far from satisfactory with both mixtures, the treated trees showing serious incrustation, although not quite as bad as those left untreated. This orchard furnishes an instance of the awful multiplication of scale in a single season. When the trees were sprayed on April 19th, a record was made in our note books to the effect that the orchard was comparatively free from scale, yet on October 24th, when we examined the orchard, the trees were very badly encrusted.

Scalecide and Carlson's Mixture were applied to some Japan plum trees belonging to Mr. Porter Adams, Queenston. Results were not satisfactory, as the trees are now badly infested.

A few Bartlett pear trees in Mr. Hodgett's garden, St. Catharines, were sprayed with the summer strength of Scalecide, but the results showed it powerless to control the scale.

Mr. Henry Kottmeier used Carlson's mixture on his plum orchard, but the results here too were far from satisfactory, and the majority of the trees are now badly infested.

In a small orchard near Mr. Kottmeier's, Carlson's Summer Mixture was applied, but it was not able to any extent to prevent the scale from multiplying. The treated trees are now badly infested.

Other examples of treated orchards might be stated, but enough has been given to show the values of the different mixtures as scale destroyers. None of the new mixtures, such as Carlson's, Pratt's Scalecide, or the kerosene-flour emulsion, can be recommended to the fruit-growers as effective remedies for the San Jose Scale. The lime-sulphur washes gave better results in every case that came under our observation.

We are not in a position to decide definitely whether the uncooked lime-sulphur wash or the cooked wash is the better remedy. To us it would appear that the personality of the man who makes and applies the wash counts in most cases for success or failure. Careful preparation of the wash according to formula, the use of good rapid-slaking stone lime, and thorough application to the trees will in nine cases out of ten check the scale completely. Moreover, we are of the opinion that the addition of salt to the wash would increase its adhesive qualities, and add to its effectiveness.

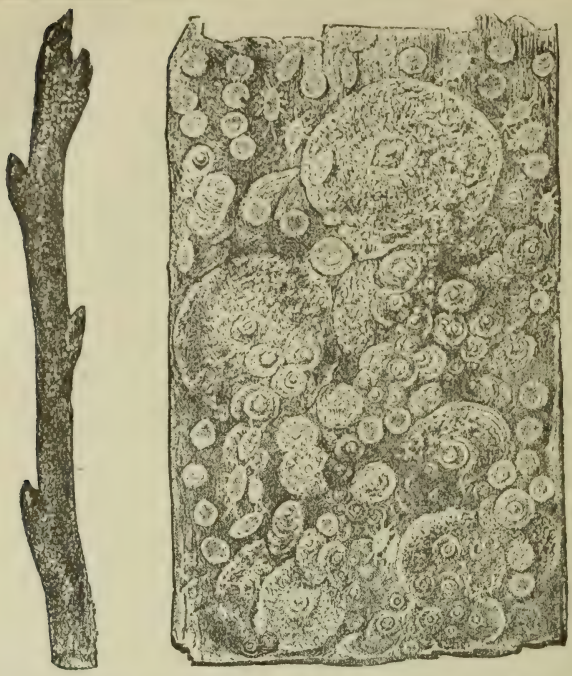


Fig. 12. San Jose scale: an infested twig, scales and larvæ on bark—much enlarged. (After Howard and Marlatt.)

Prof. J. B. Smith, upon being called upon by the Chairman, said that it was evident that the experience in dealing with the scale was in no two places the same. In New Jersey it was found that the effect of spraying with lime and sulphur was slow and cumulative; if properly done, no young were produced, and the results were very satisfactory. In Georgia, in a large orchard, containing over half a million trees, the lime and sulphur wash was used without any salt and with a larger proportion of lime than usual; the mixture, it was found, did not adhere so well to the trees. The next time salt was added to the mixture, but not much difference was to be seen in the results. The addition of salt made it spray more easily and spread better. In Georgia and elsewhere many fruit-growers think that the application of the lime and sulphur wash spoils the trees, and therefore they prefer to use the oil treatment, either crude petroleum or kerosene. Pratt's Scalecide, a preparation of soluble petroleum, was found satisfactory.

With lime and sulphur he found that the thinner the wash the better it penetrated: he recommended boiling the mixture because by so doing good results can be secured even with bad workmanship and inferior materials, and using equal parts of lime and sulphur. This mixture was effective on peach and plum trees. but was no good on apple and pear trees. An apple orchard was treated with this wash, and in June the trees were still coated, but they did not bear an apple worth marketing on account of the scales that covered them.

For apple and pear trees he recommended the oil treatment, using one part of petroleum with twenty of water. Spraying should be done as early as possible in the fall because many of the scales were still active and they were not so closely adherent to the trees as later on in the winter; the oil could therefore get at them better and destroy the insects. This method was very effective in keeping the scale in check, and we could not hope for extermination.

Dr. Fletcher, the chairman, in closing the discussion, said that it was evident that good results can be obtained in the contest with the San Jose Scale by using the crude petroleum treatment on apple trees and the lime and sulphur wash on peach and plum.

EVENING SESSION.

Wednesday, October 18th, 1905.

A public meeting was held in the Massey Hall at the Ontario Agricultural College, at 8 o'clock p.m., and was largely attended by members of the Society, students of the College and Macdonald Institute, and visitors from the city of Guelph. The chair was taken by Dr. Fletcher, the Vice-President.

President Creelman welcomed the Society to the Ontario Agricultural College and gave an outline of the different departments of work in it and the affiliated Macdonald Institute. They might be regarded as forming three main divisions: the College for training farmers' sons in all that relates to agriculture; the Farm for growing farm products and carrying on experiments in the cultivation of all manner of field crops, fruits and vegetables, the raising of stock, etc.; the Macdonald Institute, with its two-fold objects of training teachers from rural schools in nature study and elementary agriculture. for which purpose 45 or 50 came three times a year, and of teaching farmers' daughters the best methods of performing household work, such as cooking, sewing, laundry-work, dressmaking, millinery, etc.

Two of their departments of work could hardly fail to strike the average man, these were Agronomy or Field Agriculture, and Animal Husbandry; in the former, seeds of all kinds from all parts of the world are tried and their suitability for this Province tested. Experiments have been going on for some twenty years, some plants are found to be no good and are cast aside, others are useful forms or improvements on those in ordinary cultivation and are duly propagated and made known as widely as possible. About 2,000 plots are employed for this purpose and careful records are kept of each. The value of Animal Husbandry may be gathered from the fact that about eighty per cent. of the produce of farms is fed to live stock; it is therefore most important that farmers should know what is the best breed for his purposes and how the animals should be most advantageously fed and treated. In the spring two hundred farmers are brought here and shewn stock from both the farm and the neighbourhood, in order that they may learn all about them.

Other departments that may be briefly referred to are those of Chemistry for the analysis of soils, food products, fertilizers, etc.; Physics; Bacteriology; Horticulture for testing all sorts of fruits and vegetables; Dairying, a most important department, as it is worth millions of dollars to Ontario that the best butter and cheese should be made and exported; Poultry raising, for teaching the best methods and so reaping the largest profits.

The College is now visited in the month of June each year by farmers and their families to the number of 25,000 to 30,000, who are brought here from all over the Province by special excursion trains. Few of them probably return to their homes without having learnt something that they can turn to practical advantage in their own work. The College, too, is filled with young men who are taking long or short courses of study, and who go back to the farms with a training that will make them more progressive and successful workers, and who will influence for good all those in their own neighbourhood.

Dr. Fletcher, in reply, spoke of the high position the College had attained in public estimation and the great value of its work in improving in all departments the agriculture of the country. While its object was largely to teach how to increase and improve the products of the farm, the work of the Entomological Society was devoted to the saving of a proportion of the crops that would otherwise be destroyed by insects and be a serious loss to the farmer.

Mr. B. Barlow, the President of the Wellington Field Naturalists Club, welcomed the Society to Guelph and extended the cordial greetings of the Club. In the course of his remarks he mentioned that the Club had now been organized for five years, and during that time had devoted itself to the study of the fauna and flora of the County of Wellington, the aim being to make in time a complete biological survey of the district. So far, they had formed a list of over 200 birds observed in the county, with a record of dates, breeding, numbers, etc., and were not likely to add many more to it. In botany, flowers, plants, grasses, ferns, sedges, etc., were being collected and studied; fishes and other aquatic animals, mammals such as squirrels, moles, mice, etc., were also under observation. Fortnightly meetings were held either in the town or at the College and were well attended. He spoke with much gratification of the formation of the new Guelph branch of the Entomological Society, which had been completed this morning, and with which the Club would work hand in hand.

Dr. Fletcher acknowledged the kind greetings of the Club and stated that it was now widely known and had established an excellent reputation for careful work and accurate records. He then introduced the lecturer of the evening, Dr. John B. Smith, Professor of Entomology at Rutgers' College, New Jersey, and head of the Entomological Department of the New Jersey Agricultural College Experiment Station, a notable entomologist of world-wide reputation, one who was distinguished for his scientific work on nocturnal lepidoptera, his practical work in economic entomology and his important researches regarding mosquitoes and public work for their extermination in some badly infested regions on the coast of New Jersey.

The following is a brief abstract of Prof. Smith's lecture, which was illustrated with a large number of lantern slides made from original photographs and drawings.

A REVIEW OF THE MOSQUITO WORK IN NEW JERSEY.*

By John B. Smith.

Mosquitoes are essentially aquatic in the larval stage and none have yet been found that form an exception to this rule. As the larvæ of nearly all the troublesome species are known, and all breed in water, it is safe to plan for practical work on the assumption that the habit is universal.

Of the adult mosquitoes only the females bite, the lancet-like structures being undeveloped in the male which, necessarily, subsists on plant juices only. When a mosquito bites, it injects into the wound a minute drop of poison (saliva) and this seems to break up the blood structure so that it no longer forms a clot: a smear from the mosquito stomach spreads out thin and dries to a brittle scale.

That mosquitoes are active agents in the transmission of certain febrile diseases is no longer seriously questioned and, in general, it is agreed that

*Abstract of a lecture delivered at the evening meeting, Oct. 18th and illustrated with lantern slides.

they are also the only agents; the life cycle of the malarial Plasmodia being now fully understood. In a patient suffering from malaria the single celled protozoöns are present in the red blood corpuscles, each of which furnishes nutriment for one *Plasmodium* which matures and reaches the reproductive or sporulating stage in 24, 48 or 72 hours, according to its kind. When ripe, the cell bursts and the pores are discharged into the blood serum. As all the organisms mature at practically one time, this general sporulation upsets body conditions and a "chill" results. The spores work their way into new corpuscles and the cycle is repeated. After a time bodies are produced that make no attempt to enter new corpuscles; but remain in the blood serum. These are the "gametes" or sexed forms of the animal and they undergo no further development in man. If an *Anopheles maculipennis* now bites the patient, it will take in with the blood some of these gametes which, as soon as they get into the mosquito stomach differentiate. The smaller forms or micro-gametes produce "flagellæ," which break off and conjugate with the larger or macro-gametes, the product of the union forming a "vermicule," which works into the tissue of the mosquito stomach. This developes into a "zygote" and, in about a week that becomes mature, bursts and liberates into the body cavity, thousands of "blasts" which, sooner or later find their way into the salivary glands. Now, when such a diseased mosquito bites a healthy subject, some of the "blasts" are introduced into the wound with the saliva and, if the subject is susceptible, a case of malaria is established; the "blasts" working their way into the red blood corpuscles and starting the vegetative cycle.

The species of Anopheles select quiet pools of water bodies as breeding places and, floating on the surface can maintain themselves in shallows out of reach of most fish. The adults do not fly far and local work is likely to be be effective.

Some mosquitoes migrate or fly for long distances from their breeding places and among those are the species that breed in the salt marshes which occur so generally along the New Jersey coast. These breed as readily in salt as they do in fresh water and their influence extends inland 40 miles at least. In New Jersey this species is dealt with by ditching work, which gets rid of surface water before the larvæ have a chance to develop. The eggs of these migratory species are laid in the marsh mud and in that stage they pass the winter. The high tides of spring furnish water for their development and the broods begin early in May. The specimens that fly far inland are all females, and all of the migrants are infertile.

Filling as well as ditching is practised in some places, and much of the Brooklyn rubbish is gathered in huge tanks, transported on trolley flat cars and dumped on the marshes of Gravesend Bay near Coney Island, N.Y., to the material advance of comfort in that resort.

The common house mosquito, *Culex pipiens*, breeds anywhere and in liquids of all kinds from decently clean water to sewage and even liquid manure. It forms an egg boat and is the only species that agrees in all respects with the early published accounts of mosquitoes. It is not a carrier of any disease known in our climate and it is more as a first class nuisance than as a danger to health that it challenges attention. Local work is very effective against this species, and, indeed, only local work is likely to be of any benefit, since the species is not a traveller.

There is no sort of place where water occurs where mosquitoes will not breed, and even tree holes have their own fauna. In New Jersey one species of *Anopheles* and two species of *Culex* occur nowhere else.

The most marked recognition of the mosquito danger ever displayed was in the fight carried on against the recent epidemic of yellow fever at New Orleans, La. The surgeons in charge accepted the theory of transmission by *Stegomyia* only and bent all their efforts *first*, to the destruction of the *Stegomyia*, and *second*, to protecting patients and others from mosquito bites. As to the habits, etc., of this species I must speak at second hand, since it does not occur in New Jersey.

MOSQUITOES.

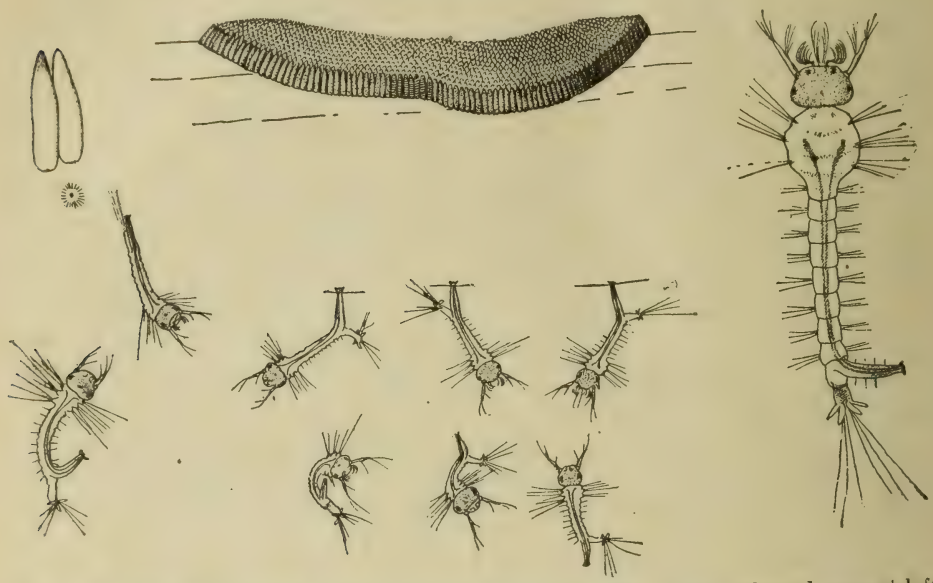


Fig. 13. Mosquito (Culex pungens) egg-mass above, with much enlarged eggs at left; larvæ on right and below. (After Howard, U. S. Dept. of Agriculture.)

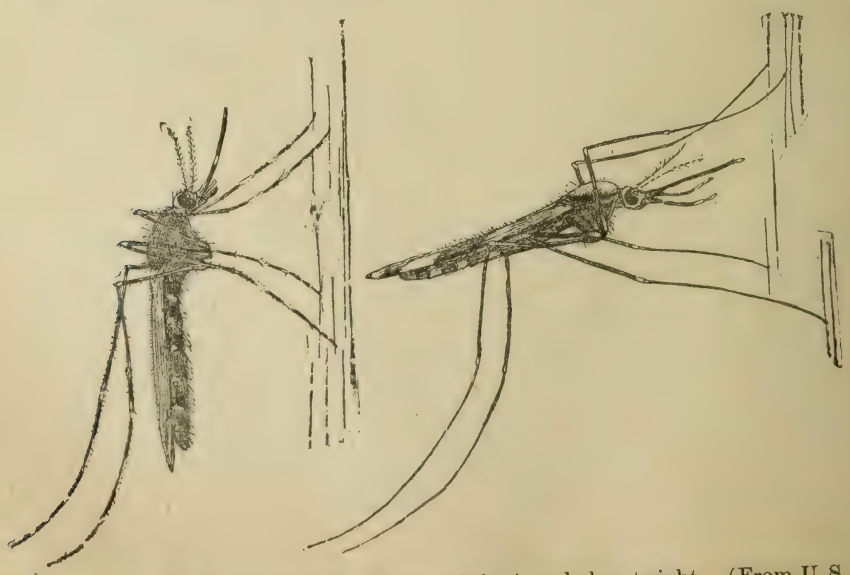


Fig. 14. Adult Mosquitoes at rest: Culex at left, Anopheles at right. (From U.S. Dept. of Agriculture.)

Fig. 15. Mosquitoes (Culex pungens) : female above, male below—different forms of scales. All greatly enlarged (after Howard, U. S. Dept. of Agriculture.)

At the close of the lecture which was listened to with marked attention and interest by the large audience, a hearty vote of thanks to Prof. Smith was proposed by Mr. C. C. James, Deputy Minister of Agriculture for Ontario, seconded by the Rev. Dr. Fyles, of Quebec, and enthusiastically adopted by the meeting.

SECOND DAY'S SESSION.

Thursday, October 19th, 1905.

The Vice-President, Dr. Fletcher, took the chair at 10 o'clock a. m. There were forty-six persons present and this number was increased during the morning.

Mr. T. D. Jarvis, Lecturer in Entomology at the Agricultural College, read papers, illustrated by specimens, on insects collected in Jamaica; two species of Saw-flies (Lvda) taken at the College Farm; notes on the genus Phytoptus; three species of bumble bees that fertilize red clover at Guelph; notes on two species of Fenusa; and Parasites of the Abittibi country.

Papers were also read, and will be found in subsequent pages of this report, by Dr. Fyles on forest insects; Mr. A. Gibson on insects of flowering plants; Mr. Lyman on the Formation of an Entomologist's Union;* Mr. Zavitz on some forest insects; also a paper sent by Mr. J. Stevenson of Montreal on insects of the season.

During the sessions a large number of rare and interesting specimens were on exhibition and attracted much attention. Mention may be made of the following:

By Professor Sherman: some small collections of recent captures of local insects, to show his system of labelling; among them was a remarkable form of *Pyrameis cardui*, the Painted-lady butterfly.

By Mr. Zavitz: a large number of wood-boring insects (Cerambycidæ) collected at Ridgeway, Ont.

By Mr. T. D. Jarvis: a number of Jamaican insects, sawflies and other insects, referred to in his papers, taken at Guelph.

By Mr. Lyman: a case of lepidoptera in which were interesting specimens of Gortyna and other noctuids, and also some rare diurnal Lepidoptera.

By Dr. Fyles: a number of forest insects in illustration of his paper.

By Mr. Young: a magnificent case containing over a thousand specimens of Micro-lepidoptera all most beautifully spread and mounted; also a number of Noctuids—these were all collected at Ottawa during the season of 1905. He also exhibited some living specimens of the grotesque pupæ of *Feniseca Tarquinius*.

By Dr. Fletcher: a collection of Lepidoptera made in the Yukon Territory by Mr. J. Keele of the Dominion Geological Survey Department; this included *Colias Boothii* and *Pelidne*, *Erebia Magdalena* and *Disa*.

By Mr. A. Gibson: a case of rare lepidoptera, inflated larvæ, and living larvæ of *Apantesis vittata* received from Mr. E. Denny of Montreal.

By Mr. C. W. Nash: specimens of a remarkable fungus growth (Cordyceps) on wire-worms.

Many of these exhibits will be found recorded, with dates and other particulars, in the "Entomological Record for 1905."

*Published in the Canadian Entomologist

REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario begs to present its report for the year 1904-5.

The forty-first annual meeting of the Society was held in London on the 26th and 27th of October, 1904, and was well attended by local members as well as by many from a distance. There were also present Prof. H. F. Wickham, of the University of Iowa, Iowa City, an eminent coleopterist and an honorary member of the Society, and Mr. T. N. Willing, Chief Inspector of Weeds and Naturalist for the Department of Agriculture, Regina, N. W. T. During the first afternoon reports were read from the various Branches, Sections and Officers of the Society, and from the Directors on the notable insects of the year in their respective districts. Mr. Willing gave an interesting account of the methods adopted in the North-West Territories for controlling noxious weeds and dealing with injurious insects.

In the evening a public meeting was held at the Normal School at which the President, Professor Lochhead, read his annual address and Prof. Wickham gave an able and interesting paper, illustrated by a large number of lantern slides made from his own photographs, on "The Great Basin in the Western States and its Entomological Features." The second day was taken up with the election of officers and the reading of papers on a variety of entomological subjects. A large number of interesting specimens were also exhibited by the members present.

The 35th Annual Report on economic and general entomology was sent to the Department of Agriculture in January last and in due course was presented to the Legislature of Ontario and ordered to be printed. Owing to changes in the methods adopted by the King's printers and other causes for which we are unable to account, the volume has only just been published. The great delay impairs to some extent the value of the report, and has produced wide-spread complaints from members and correspondents in all directions.

In addition to the papers already referred to, the volume contains the following among other articles: "Insects injurious to Ontario crops in 1904" and the valuable "Entomological Record for 1904," by Dr. James Fletcher; "Notes on the Basswood, or Linden insects" and on "The Columbine Borer" by Mr. A. Gibson; "Insect Names and Insects Lists," by Mr. J. B. Williams; "Insects collected at light during 1904," by Mr. J. D. Evans; "Insects affecting the oak," and "the Food habits of certain Hymenoptera," by Rev. Dr. Fyles; "Notes on the Season of 1904 in Western Quebec," by Mr. C. Stevenson; "An elementary study of insects," by Prof. Lochhead; an obituary notice, with portrait of the late J. Alston Moffat.

The Canadian Entomologist, the monthly magazine of the Society, has been regularly issued. The 36th annual volume was completed in December last and ten numbers of volume 37 have now been published. The volume for 1904 consisted of 367 pages and was illustrated with four full-page plates, one of which was coloured, and a number of figures from original drawings. The contributors numbered 63 and included writers in Canada, the United States and England. The articles are for the most part scientific and contain, among much other highly valuable matter, descriptions of 217 new species and varieties and 11 new genera in various orders of insects. The material contained in the volumes of our magazine is so important and necessary to scientific workers that there is a constant demand from various parts of the world for complete sets or separate volumes and numbers.

During the winter months classes were held fortnightly on Saturday evenings for practical instruction in the elements of entomology as a basis

for nature study work. They were attended by a number of teachers from the Public Schools in London as well as by other members of the Society The course was begun by Prof. S. B. McCready and after his appointment to the Macdonald Institute at Guelph, was continued by Dr. Bethune. When spring opened, the subject was changed to Botany, several outings to the country in the neighborhood were made, and the wild plants collected were carefully studied. Owing to various causes, especially to the absence or want of time on the part of the leaders, no formal meetings of the Sections were held. A number of popular lectures, illustrated by lantern pictures, were given by Dr. Bethune on insects and by Mr. W. E. Saunders on birds, under the auspices of various organizations in London and some of the neighboring towns.

Prof. Lochhead also has given lectures at several places on entomological and other subjects.

The reports from the branches of the Society at Montreal, Quebec and Toronto are highly satisfactory; great interest is taken in their proceedings by the local members and much good work has been accomplished.

The Council has much gratification in recording the formation of an active Branch in British Columbia, with head-quarters at Vancouver and an initial membership of eighteen; quarterly meetings are held and it is expected that, with so many energetic and enthusiastic members, rapid advancement will be made in the knowledge of the insect fauna of the Pacific Province.

To-day the Council has the additional pleasure of authorizing the formation of a Branch here at Guelph and welcoming the members to our annual meeting. The large number of members, no less than 24 at the outset and the presence of Professors and Students of the Agricultural College and Macdonald Institute, give the Branch a unique position and ensure its permanent success.

The Council desires to record its sorrow at the loss of one of its earliest Honorary members, Professor Alpheus S. Packard, M.D., who died at Providence, Rhode Island, on the 14th of February last. He was a distinguished entomologist, and author of a large number of books, both popular and scientific, on a variety of entomological and biological subjects; he also contributed from time to time to the "Canadian Entomologist." His name is held in high honour in Europe as well as throughout North America.

The Council has much pleasure in offering its hearty congratulations to Professor Lochhead on his appointment to an important position on the staff of the new Macdonald Institution at St. Anne's, P.Q., and has every confidence that, in his new sphere of active duty, he will continue to do good work in economic and scientific entomology and extend the influence of our Society.

To Professor Franklin Sherman, who has recently been appointed to the chair of entomology in the Ontario Agricultural College, the Council extends a cordial welcome, and feels assured that he will prove thoroughly efficient in his work and do much to encourage and direct his students in the earnest pursuit of this Department of Natural Science.

The outlook for the Society was never brighter or better, and the Council calls upon each member to do his share, in his own neighbourhood, in making investigations in insect life and extending the usefulness and influence of the Society.

All which is respectfully submitted.

JOHN D. EVANS,
President.

REPORT OF THE MONTREAL BRANCH.

The 267th regular, and 32nd annual meeting of the Montreal Branch of the Entomological Society of Ontario was held on May 8th, 1905, at the rooms of the Natural History Society.

The following members were present,—A. E. Norris, (President); A. F. Winn; D. Brainerd; Alfred Griffin; L. Gibb; G. Chagnon; E. C. Barwick; G. R. Southee; S. Robinson; Chas. Stevenson; Geo. A. Moore; H. H. Lyman; and four visitors.

Minutes of April meeting were read and confirmed, and those of the last annual meeting were taken as read.

The President read the following

Report of the Council.

The Council in submitting this report feel encouraged in knowing that the Society is not only keeping up its honorable traditions, but is going ahead in a manner worthy of the strenuous times in which we are now passing. Nine regular meetings have been held during the year, the average attendance being a fraction over 7. Twenty-six papers were read, viz.

President's address, Chas. Stevenson.
A talk on Lycaenidæ, A. F. Winn.
Hydrœcias, illustrated by colored slides, A. E. Norris.
Leaf Hoppers, Fam. Jassidæ, G. A. Moore.
Pontia rapæ, n. var. rhaphanus, C. Stevenson.
Notes on Saperda, G. Chagnon.
Cydnidæ—Burrowing Bugs, G. A. Moore.
Mompha eloisella, A. F. Winn.
Notes on some types, and other specimens in the Br. Museum, H. H. Lyman.
The water-lily moth, A. F. Winn.
Notes on travel, with random observations on Entomology, H. H. Lyman.
Brief notes on breeding specimens of the past season, H. H. Lyman.
Cercopidæ, or Spittle insects, Geo. A. Moore.
Notes on Canadian species of Donacia, G. Chagnon.
Notes on Hemiptera for season 1904, Geo. A. Moore.
Stenopelmatus fasciatus—The sand cricket, A. F. Winn.
Small-headed fly—Pterodontia flavipes, Gray, Chas. Stevenson.
Report on annual meeting at London, H. H. Lyman.
Berytidae, or Stilt-bugs, Geo. H. Moore.
More about Micro Lepidoptera, A. F. Winn.
Notes on the species of Saperda in my collection, C. Chagnon.
New Gortynas, H. H. Lyman.
Criocephalus obsoletus and Asemum moestum, a correction, G. Chagnon.
Agamic reproduction in insects, A. F. Winn.
How to describe larvæ, H. H. Lyman.
Hemipterous nymphs, Geo. A. Moore.

Field days were held at St. Hilaire, Que., May 24th and July 1st and at the Maisonneuve Woods on April 21st, 1905.

At the annual meeting held at London, the branch was represented by Mr. Lyman.

During the year two new members were added to the Society.

Respectfully submitted on behalf of the Council.

(Signed), A. E. Norris,
President.

The Treasurer submitted his report, showing a balance on hand of $58.71.

Reports of the acting Curator and Libarian were presented, and on motion of Mr. Winn, seconded by Mr. Brainerd, were received and adopted.

Mr. Norris read his annual address.

The election of officers for the coming year resulted as follows:

President, A. E. Norris, re-elected.

Vice-President, Geo. A. Moore.

Secretary-Treasurer, A. F. Winn.

Curator and Librarian, Chas. Stevenson.

Council, E. Denny, L. Gibb; H. H. Lyman, G. Chagnon.

It was decided to hold a field day at St. Hilare on May 24th and that the Council should also arrange for a suitable place to spend July 1st.

Mr. Winn reported that the President of the Natural History Society had invited the Branch to attend their outing at Mount Johnston, on Saturday June 10th, and in order to encourage entomological collections moved, seconded by Mr. Chagnon, that the Branch should provide two books suitable for entomological prizes to the Natural History Society for the best collections made on that occasion.

Mr. Norris gave a talk on butterflies and moths, illustrated by original, colored lantern slides. He was assisted at the lantern by Mr. Griffin.

The meeting then adjourned.

(Signed), GEO. A. MOORE.
Secretary-Treasurer.

REPORT OF THE QUEBEC BRANCH.

The annual meeting of the Quebec Branch was held on the 8th day of November, 1905, at the house of the President.

There were present: The Rev. T. W. Fyles in the chair, the Rev. W. W. McCuaig, Lt.-Col. Crawford Lindsay, J. H. Simmons, Esq., Mrs. R. Turner, Mrs. Simmons, Mrs. Poston, Mrs. Fyles, Miss Hamel, Miss Freeman, Miss Bickell, Miss Hedge, Miss W. Fyles, Miss Russell.

The minutes of the last meeting were read and confirmed.

Mr. A. R. M. Boulton was elected a member of the Branch.

The President then addressed the meeting upon some of the noteworthy entomological incidents of the year: the alarmist articles in the public press upon the larvæ of *Orgyia antiqua* and *O. leucostigma;* the interesting discovery by Mr. C. W. Nash of Toronto of a fungus that takes possession of the wireworm, much as *Cordyceps melalonthae* does of the white grub; the abundance of the spiny caterpillars of *Cynthia cardui* upon the burdocks and holly-hocks; the appearance at Quebec, in great numbers, of the cotton moth, *Aletia argillacea;* late captures including that of *Catocala relicta* at the electric light, etc.

The officers elected were: President, Rev. Dr. Fyles; Vice-President, Miss E. Macdonald; Secretary-treasurer, Lt.-Col. Crawford Lindsay; Council, Hon. R. Turner, Rev. W. W. McCuaig, Mrs. Turner, Miss Bickell, Miss Freeman.

Hearty votes of thanks were passed to the President and the Secretary-treasurer and the hostess of the occasion.

REPORT OF COUNCIL.

The Branch now includes 25 members (22 adults and 3 juniors).

The Treasurer's report will be submitted and will no doubt be found satisfactory.

During the year interesting lectures were delivered by the President.

The Council regret to have to record the death of one of the members, Mrs. Morgan. A resolution of condolence was passed and forwarded to the husband of the deceased, Major James Morgan, and to her relatives.

Our thanks are due to the authorities of Morrin College for having continued to allow us to use their rooms for our meetings.

CRAWFORD LINDSAY,
Secretary-Treasurer.

REPORT OF THE TORONTO BRANCH.

The ninth annual meeting of the Toronto Branch of the Entomological Society of Ontario was held in the Provincial Museum, St. James's Square, on June 22nd, 1905.

The President Dr. Brodie was in the chair, and the following members were present: Messrs. Paul Hahn, J. B. Williams, R. Hallam, M. Hallam, J. H. Webb, Dr. E. M. Walker, J. H. Maughan, Junr., and Dr. Abbott.

The Secretary, Wm. John Maughan, Junr., read the following report. "Your Secretary-Treasurer, has the pleasure to announce another year's statement of prosperity and advancement for 1904-5.

We have kept our membership up, and although some members have moved away, other new ones have joined.

The list of papers and lectures attached hereto have been splendidly descriptive and scientifically accurate, and not a few of them covered new and hitherto unknown material; some have been illustrated by lantern, others by specimens, charts, and drawings; putting before the members most completely all material connected therewith.

The attendance at meetings has been good, although the weather at times has not been propitious.

Your Secretary-Treasurer has also to announce that the Librarian-Curator has arranged and hung in the museum another large case of specimens, showing moths found in and near Toronto; also to thank members for their kind donations both of specimens and publications.

It is with sincere regret that your Secretary-Treasurer announces his withdrawal from the position he has held for some years past, and begs to thank the members, as a whole, for their kindness and courtesy shown to him on all occasions.

All of which is respectfully submitted.

(Signed) J. MAUGHAN, JR.,
Secretary-Treasurer.

List of papers read, 1904-5.

"The Leaf-cutting bee (Megachile brevis) and its Parasite", Dr. Brodie.
"A week at Lorne Park," J. B. Williams.
"Insects of North Ontario," G. M. Stewart.
"Galls of Oak," Dr. Brodie.
"Orthoptera," Dr. E. M. Walker.
"Scales on Butterflies Wings," J. B. Williams.
"The Tussock Moth and its Parasitical Life," Dr. Brodie.
"Dragon flies," Dr. E. M. Walker.
"A trip to Algonquin Park," Paul Hahn.

The following officers were elected for 1905-6:
President, Dr. Wm. Brodie.
Vice-President, Paul Hahn.
Librarian and Curator, J. B. Williams.
Council, Messrs. Leslie Walker, J. H. Webb, R. Hallam and Dr. Abbott.

Secretary-Treasurer, Mr. H. S. Saunders was elected, but he finds himself unable to accept the position, and another Secretary will have to be elected at the next meeting of the Society. Miss E. Blackmore, 242 Borden street, was subsequently elected.

The Treasurer's report shows the funds to be in a satisfactory condition with a balance of ninety cents on the right side.

GUELPH BRANCH.

The Guelph Branch at its meeting for organization has drawn up and adopted the following:

CONSTITUTION.

Article I. Name.

The name of this Society is the Guelph Entomological Society—a Branch of the Ontario Entomological Society.

Article II. Object.

The object of this Society is the increase and diffusion of the knowledge of insects.

Article III. Membership.

Section 1. Members shall be persons interested in insects. Members shall be elected by a two-thirds vote of the members present at any meeting.

Section 2. There shall be not less than six members resident in Guelph and vicinity.

Article IV. Officers.

Section 1. The officers shall be a President, Vice-President, and Secretary-Treasurer, elected at the annual meeting to serve one year.

Section 2. The President shall preside at the meetings of the Society. The President and the Secretary-Treasurer shall sign all written obligations of the Society.

Section 3. The Vice-President shall assume the duties of the President in the absence of the latter.

Section 4. The Secretary-Treasurer shall record the proceedings of the Society and of the Executive Committee, conduct correspondence, and make an annual report. He shall publish due announcement of the meetings of the Society. He shall be Curator of the museum of the Society.

Section 5. The Secretary-Treasurer shall have charge of the funds of the Society, and shall make collections and disbursements and render an annual report, and his accounts shall be audited by a committee of the society annually.

Section 6. All new officers shall begin their duties on the first day after the annual meeting.

Article V. Committees.

Section 1. There shall be an Executive Committee consisting of the President, Vice-President, Secretary-Treasurer, and a student appointed by the President.

Section 2. The executive shall constitute a standing committee on programmes, publications, admissions to membership, research and finance.

Section 3. The society shall elect a delegate to the annual meeting of the Entomological Society of Ontario.

Article VI. Finances.

Section 1. The fiscal year of the Society shall begin on the first day after the annual meeting.

Section 2. The annual dues of members shall be one dollar, payable at the annual meeting, and the dues for the first year shall be payable on signing the constitution.

Section 3. Members whose dues remain unpaid one month after they are due shall be notified by the Secretary-Treasurer that within one month they will be in arrears and not entitled to a vote at the annual meeting, to receive the publications of the Society nor of the Entomological Society of Ontario. Members one year in arrears shall, after formal notification by the Secretary-Treasurer, be regarded as having withdrawn from the Society.

Article VII. Meetings.

Section 1. Regular meetings of the Society shall be held on alternate Wednesdays from October to June.

Section 2. Special meetings may be called by the President.

Section 3. The annual meeting shall be held on the first Wednesday in October.

Section 4. Six members shall constitute a quorum.

Section 5. The Executive Committee shall hold its regular meetings on the same days as the regular meetings of the Society; special meetings may be called by the President.

Section 6. The regular meetings of the Society shall be open to all.

Article VIII. Publications.

The Canadian Entomologist shall be the official organ of the Guelph Entomological Society. *The Canadian Entomologist* and the reports of the Ontario Entomological Society shall be sent to all members not in arrears.

Article IX.

The Society shall maintain a Museum.

Article X. Amendments.

These By-laws may be amended by a two-thirds vote of the members present at any regular meeting, provided the proposed amendments have been read at the last previous regular meeting of the Society.

The following officers were elected for the year 1905-6: President, Prof. Franklin Sherman; Vice-President, Richard Readwin; Secretary-Treasurer, T. D. Jarvis; Executive Committee, Messrs. Sherman, Jarvis and Klinck.

REPORT OF THE LIBRARIAN AND CURATOR.

During the year ending August 31st, 1905, thirty bound volumes have been added to the Library, making the total number on the register 1,862; also a large number of periodicals and pamphlets. Among the new acquisitions may be mentioned the fifth volume, with plates, of Sir George Hampson's "Catalogue of Lepidoptera Phalænæ" in the British Museum. During the year 27 volumes were issued to local members.

A card catalogue according to subjects has been begun and all the bound volumes of pamphlets have been indexed in this way as well as a number of entomological bulletins and reports.

The collections have been increased by the kind contribution of 123 specimens of Coleoptera, including 113 species, by Prof. H. F. Wickham of Iowa City, who took note of the blanks in the cabinets when he visited the Society during the last annual meeting. The President, Mr. J. D. Evans, sent 50 specimens of beetles, including 16 species, new to the Society's collection. Mr. J. A. Balkwill throughout the summer has brought in a large number of specimens of various orders, especially Lepidoptera and Coleoptera, and Mr. J. A. Morden, of Hyde Park, has presented some rare specimens of nocturnal Lepidoptera, for all which the Society is deeply grateful.

The Curator would repeat his desire to receive specimens of almost all of our Canadian insects to fill blanks in the cabinets and to replace old and imperfect examples; also to have the specimens provided with labels giving the important information of locality and dates of capture, etc. Any member who has specimens to spare, and every one must have some, will confer a favour by first sending a list of those he is willing to present to the Society in order to prevent unnecessary duplication. The collections of Lepidoptera and Coleoptera from Ontario and Quebec are fairly complete, but in other orders the Society is very badly off.

The number of visitors is satisfactorily, advantage being taken of the opportunities to inspect the Library and collections during three afternoons in each week, when they are open to the public.

Respectfully submitted,

CHARLES J. S. BETHUNE,
Librarian and Curator.

REPORT OF THE TREASURER.

Receipts and Expenditures of the Entomological Society of Ontario for the year ending August 31st, 1905.

RECEIPTS.		EXPENDITURES.	
Balance on hand September 1st, 1904	$445 74	Annual Meeting and Report	$91 85
Members' fees	340 71	Salaries	275 00
Legislative grant	1,000 00	Postage, stationery, etc	146 29
Sales of pins, cork, etc.	43 59	Printing	753 77
Sales of Entomologist	174 10	Pins, cork, etc.	16 31
Advertisements	41 44	Rent	171 25
Interest	7 63	Insurance	48 80
		Library	32 18
		Balance on hand	517 76
	$2,053 21		$2,053 21

J. A. BALKWILL, Treasurer.

Audited and found correct.

F. A. STUART,
W. H. HAMILTON, Auditors.

REPORT FROM THE ENTOMOLOGICAL SOCIETY OF ONTARIO TO THE ROYAL SOCIETY OF CANADA.

THROUGH JOHN D. EVANS, DELEGATE.

During the past year the Entomological Society of Ontario has drifted along in its usual even tenor, doing good work and progressing steadily and has passed the upwards of two score years of its existence.

The forty first annual meeting was held in October last, in its new, commodious and accessible quarters in the Public Library Building, Queen's Ave., London, the attendance being good, and among those present were four representatives of the gentler sex. From a distance may be mentioned the presence of Mr. T. N. Willing, Chief Inspector of Weeds for the Department of Agriculture, Regina, N.W.T., and from among our neighbors from across the border we gladly hailed the presence of an oft contributor to our magazine in the person of Prof. Wickham of the University of Iowa, Iowa City.

After the usual routine of business at the morning session the President opened the proceedings in the afternoon, at which the reports of the several Directors on the injurious insects of the year were read.

A feeling reference was made to recent death of the valued and faithful Curator and Librarian, J. Alston Moffat.

Mr. T. N. Willing presented a most interesting account of the methods inaugurated for the eradication of the noxious weeds in the North-west Territories, following which, Prof. Lochhead read his paper on the injurious insects of the year in Ontario.

The reports from the Toronto and Montreal Branches were also read.

A very largely attended and appreciative meeting was held in the evening in the Normal School presided over by Dr. Jas. Fletcher, at which Prof. Lochhead read his Presidential address on "Recent Progress in Entomology," and Prof. Wickham gave a most interesting lecture illustrated by a large number of beautiful lantern slides on "The Great Basin in the Western States and its Entomological Features."

The 35th annual report of the Society to the Legislature of Ontario has been presented in which is given a full report of all the papers read at the annual meeting. In addition to the afore-mentioned the following of the most important contributions may be enumerated, viz.,—

"Insects Injurious to Ontario Crops in 1904," and "Entomological Record 1904," by Dr. Fletcher.

"Further Notes on Basswood or Linden Insects," and "Notes on the Columbine borer," by Arthur Gibson.

"Insects Collected at Light during 1904," by J. D. Evans.

"Spining Methods of Telea Polyphemus," by J. W. Cockle.

"Insect Names and Insect Lists," by J. W. Williams.

"Notes on the Season of 1904 in Quebec," by C. Stevenson.

"Insects Affecting the Oak," and "On the Food-Habits of Certain Hymenoptera," by T. W. Fyles.

"An Elementary Study of Insects," by Wm. Lochhead.

"The Pear Tree Psylla and How to Deal with It," by G. E. Fisher.

Obituary notice of the late John Alston Moffat.

The foregoing is termed the annual report; in addition to this is published monthly the magazine, *The Canadian Entomologist*, now in its 37th year.

The 36th volume (being for 1904) consists of 367 pages, has four full-page plates and a number of cuts from original drawings. The contributors are 63 in number, embracing thirteen Canadian, thirty-nine in the neighboring Republic and one in England.

The papers cover all the important orders of insects, such as Lepidoptera, Hymenoptera, Diptera, Coleoptera, Orthoptera, Hemiptera, and Neuroptera, throughout which are described 217 new species and varieties and 11 new genera.

The papers being too numerous (being upwards of one hundred, besides numerous short paragraphs, book reviews and obituary notices,) to designate all by title; a few of the more important may be mentioned such as,—"Classification of the Fossorial, Predaceous and Parasitic Wasps, or the Super-family Vespoidea," by Wm. H. Ashmead; "Several New Diptera from North America," by D. W. Coquillett; "Notes on North American Stratiomyidæ," by A. L. Melander; "New Noctuidæ from British Columbia," by Harrison C. Dyar; "Synopsis of Anthopila," by Charles Robertson; "The Diptera of British Columbia," by James S. Hine and Raymond C. Osburn; "Synopsis of Bees of Oregon, Washington, British Columbia and Vancouver," by H'y. L. Viereck, *et al.*; "New Tortricids from Kaslo, B.C., and the Northwest," by W. D. Kearfott; "Descriptions of Some New Species and Varieties of Canadian Butterflies," by Dr. Fletcher; "The Crickets of Ontario," also "Notes on the Locustidæ of Ontario," by E. M. Walker; "New Noctuidæ for 1904," by Prof. John B. Smith; "New Species of North American Lepidoptera," by Dr. Wm. Barnes; "Synopsis of Prosopis and Colletes with Supplementary Notes and Descriptions," by Charles Robertson; "New Species of North American Asilidæ," by E. A. Back; "On Some New Coleoptera, Including Five New Genera," by Thos. L. Casey; "A Review of Our Geometrid Classification," by Richard F. Pearsall.

"The British Columbia Entomological Society" has recently become affiliated with us and is now the *B. C. Branch* of the Entomological Society of Ontario. Thus are we "lengthening our cords and strengthening our stakes."

During the winter months regular classes have been held fortnightly in London for the study of entomology under the direction of Mr. S. B. McCready, Science Master of the London Collegiate Institute and now Nature Study Professor at the Macdonald Institute, Guelph, assisted by Dr. Bethune.

These meetings have been well attended, chiefly by teachers in the public schools of the city.

Similar instruction has been begun in botany and will be carried on during the summer, excursions being made for specimens to different parts of the surrounding country.

A number of lectures illustrated with lantern pictures on noxious, beneficial and interesting insects have been given by Dr. Bethune in London and a few places in the neighborhood.

Prof. Lochhead of Guelph has given lectures on similar subjects in Hamilton and elsewhere.

The Library and collections of the Society are open to the public on three afternoons in each week and attract a fair number of visitors.

AFTERNOON SESSION.

Thursday, October 19th, 1905.

The Vice-President, Dr. Fletcher, took the chair at 2.30 o'clock, p. m.; there were about eighty persons present. The first business of the session was the election of officers for the ensuing year, which resulted as shown on page 2.

Prof. SHERMAN, who has been recently appointed to the chair of Entomology at the Ontario Agricultural College, on being called upon, said that his duties were confined to entomology in all its bearings and departments, now that is was separated from the teaching of botany and other subjects. Among other objects he had especially in view the formation of a representative collection of the insects of all orders to be found in the Province of Ontario, and a catalogue giving dates, localities, etc. He intended that every specimen should be properly labelled so as to give all necessary data regarding it, and he exhibited some recent captures showing his method of labelling. He expected that the Entomological Society would help the College and the College would certainly help the Society.

The Chairman then read the annual address of the President and expressed the regret that was felt by all at the absence of Mr. Evans.

ANNUAL ADDRESS OF THE PRESIDENT.

By JOHN D. EVANS, C.E., F.L.S., TRENTON.

It is with the utmost diffidence that I presume to present to you this, the President's Annual Address, on this auspicious occasion, being the first meeting of the Society at the fountain-head of economic entomology for the Province of Ontario, the Ontario Agricultural College at Guelph.

Owing to pressure of official duties in my professional capacity for some months past, it has been quite impossible for me to prepare anything upon a special subject bearing upon the all-absorbing, instructive and useful pursuit, the study of insect life. I trust, therefore, you will kindly bear with me in the few brief remarks I may have to make and pardon me for not providing you with the intellectual treat you are usually regaled with upon like occasions.

We have met together to transact the (always) important duties attendant upon the annual meeting, and we should heartily congratulate ourselves upon having reached the 42nd annual gathering of the Society without a break or misstep either in its annual meetings or publication of its magazine for such a length of time. It is the oldest extant on this continent, I believe, save one, and is held in the highest esteem not only over the length and breadth of this continent, but also in the remote parts of the Old World. And its publication (the monthly magazine) includes among its many contributors most of the leading specialists from among our very helpful neighbors across the border, as well as occasional ones from the other side of the salt water. Nor should we omit to refer to the annual reports of this Society to the Ontario Department of Agriculture, now numbering thirty-five, which are replete with the most useful information regarding the life histories of insects, the methods of dealing with the injurious ones, and preserving the garden, orchard, and farm crops from their ravages. These reports are very much sought after, not only by those for whom they were especially prepared (the sufferers), but also by the entomologists and entomological societies the world over.

Great strides are being made in the study of the insect fauna generally, but more especially has attention been directed of late to some of the, heretofore, most neglected orders, the Orthoptera and Diptera coming well to the front, particularly the last mentioned, which has been recently catalogued by Prof. J. M. Aldrich of the University of Idaho, the species now numbering 8,300 as against 2,500 catalogued in 1878 by Baron Osten Sacken and following closely, numerically, the Coleoptera and Lepidoptera.

Among many other assiduous workers in the field on this continent who are doing good work, adding largely to the knowledge regarding their several specialties, may be mentioned Dr. J. B. Smith in the Noctuidæ, Rev. Geo. W. Taylor in the Geometridæ, and Mr. W. D. Kearfott in the Micro-Lepidoptera.

We are deeply indebted to a large number of the American specialists, among whom may be mentioned Dr. L. O. Howard, Dr. Harrison G. Dyar, Mr. D. W. Coquillet, Dr. W. H. Ashmead, Dr. Henry Skinner, Mr. E. P. Vanduzee, and Prof. H. F. Wickham, for their many patient and self-sacrificing acts in examining and naming species in the various orders for the Canadian collectors and students.

Much literature on entomological subjects has been produced during the past year, but foremost among them may be classed "American Insects," by Prof. V. L. Kellogg, of Leland Stanford, Jr., University, which is profusely illustrated with colored plates and figures in the text and provides a very valuable work for the use of nature observers, natural history students, and of general readers. Also in this category may be added "A Synonymic Catalogue of the Erycinidæ of the World," by Levi W. Mengel of Reading, Penn.

We are sorry to learn that our worthy Past-President and genial and indefatigable worker, Prof. W. Lochhead, is about to withdraw his valued services from the Ontario Agricultural College to become the Entomologist at the new Agricultural College at St. Anne's, Que., which has been founded by Sir Wm Macdonald, but although he may be somewhat further removed geographically, still we hope to always have his presence at our meetings in the future and counsel in matters pertaining to the welfare of the Society, and help and assistance in time of need. We have no doubt that his successor, Prof. Sherman, a student under Prof. Comstock, and of much experience, will prove to be the right man in the right place, and carry on the work at the College in the same thorough and painstaking manner as has been done under the regime of his predecessor.

The passing season has been, so far as I am aware, and from my own experience and observation, a very poor one for insects, generally speaking very wet, somewhat similar to the two last preceding seasons. Consequently insect life in many ways has not flourished. The forest tent caterpillar (*C. disstria*) seemingly has disappeared entirely and the presence of the Fall webworm (*H. textor*) very rarely seen.

The County of Prince Edward and the surrounding district has been noted in the past for large crops of high grade pease, but of late years the Pea-weevil (*B. pisi*) has been so destructive that the crop has been almost ruined. A great warfare has been waged against this insect pest through the instrumentality of the leading members of this Society, to wit, the active workers in this department at the Central Experimental Farm at Ottawa and the Ontario Agricultural College at Guelph. For about two years the pea crop was almost eliminated from the farming community with the hope that the shortness of the food plant would wipe out the pest. This apparently has come to pass, for this year again a very large acreage has been sown, resulting in a most bountiful crop with very little, if any, ill effects from the weevil. It

is to be hoped now that those interested will take to heart a lesson from past experience and use all the means available, which have been so thoroughly advertised and disseminated by the officers above-mentioned throughout the length and breadth of the country, so as to keep the pest within due bounds.

I learn that the San Jose Scale and Codling moth are also well under control by means of the spraying methods practised under the leadership and guidance of the afore-mentioned officers through the instrumentality of this Society.

The White Cabbage butterfly (*P. rapæ*) and Yellow Clover butterfly (*C. philodice*) have been very numerous in places late this season, but they have not apparently done any serious damage.

Nature study is a subject gaining much strength and being taken up among the schools all over the country, and is now one of the subjects recommended by the Educational Department of Ontario. Steps are being taken at this time to take up the subject in the Trenton schools, and its rootlets have taken hold in most remote outlying districts, even to the most northern extremity of this County of Hastings.

This subject has repeatedly been brought before the notice of the public by various members of this Society, lectures having been given in London and various places in the neighborhood, at Guelph, Hamilton and elsewhere, by Dr. Fletcher, Dr. Bethune, Prof. Lochhead, Prof. McCready, and others. Particular mention must be made of Prof. John Dearness, who has recently produced "The Nature Study Course," a book designed for the use of those interested in the education of the young, both boys and girls.

In furtherance of this most commendable study, reference should be made to an illustrated paper, "Practical and Popular Entomology," "Entomology in Schools," by Mr. H. S. Saunders, of Toronto, which appeared in our magazine in the February issue of this year, as being deserving of emulation by other members of our Society.

After the remaining papers on the programme had been read and discussed (they will be found in succeeding pages of this report), President Creelman expressed the pleasure which it had given him and the members of the College to have the annual meeting of the Society in their buildings, and on behalf of the students in Biology, the Wellington Field Naturalists' Club and the Entomologists, he asked the Society to meet at the Guelph College as often as it possibly could.

Prof. H. L. Hutt joined in this expression of gratification and said that he had been especially pleased to meet and make the personal acquaintanceship of many veteran entomologists whose names had long been familiar to him.

Prof. Lochhead spoke of the importance of this meeting to the students, who would receive a lasting inspiration from it.

Votes of thanks were unanimously passed to President Creelman and his staff for their kindness and hospitality; to Prof. J. B. Smith for his welcome visit and most interesting lecture; and to the reporters of the Toronto *Globe*, the Guelph *Herald* and *Mercury*, and the Toronto *Weekly Sun*, for their excellent accounts of the proceedings.

INSECTS AS NATURE STUDIES.

By S. B. McCready, Professor of Nature Study, Macdonald Institute, Guelph.

My interest in this topic is not that of an entomologist, but that of the schoolmaster. To the student of insect life nothing, perhaps, is more natural as nature studies, than insects; nothing perhaps is more likely to awaken readier interest and develop powers of careful observation; nothing in animal life has much, if any, greater concern with our lives. But while our teachers are quite ready to acknowledge that the study of insects may profitably be admitted to a place amongst the multitude of school studies, they are, as a class, quite at a loss to know how to commence the study of them. They feel afraid, or helpless, or rebellious, or indifferent. They feel that they have been imposed upon; they have been trained and accepted into a work which is suddenly changed; sometimes it is hinted that their inability to handle the work is through fault of theirs to readily adjust themselves to new conditions; in fact through insects and the other "what-nots" of nature studies, the conscientious teacher's burden has become considerably heavier in these later days.

Here are the insect studies prescribed for Manitoba schools, *e.g.*:

Grade I. Butterflies and moths. Reference to color, beauty, movements, etc.; study of simple life-history of butterfly or moth; preparation for winter by insects.

Grade II. Observation of habits of the ant, bee, wasp, and grasshopper.

Grade IV. The House moth. The eggs, the larva, the cocoon and pupa, the imago, the egg; or the study of a wasp in nest making, feeding young, guarding young, and in winter season.

Grade V. Insect life in relation to the shade trees; aphis, caterpillar and leaf gall of maple suggested; rearing mosquitoes and butterflies from eggs in order to obtain life histories; recognition of lady-bird beetle with a view to protecting it. Finding the larvæ on trees infested by aphids; observation of insect life in an old log, a rotten stump, a sand hill; incidental observation of insect life.

Grade VI. Interdependence of insects and flowers; special study of grasshoppers; finding the eggs, observing young hoppers, and growth of their wings; the most favorable weather, food how eaten, behaviour in wet and windy weather, etc.

Grade VII. Cockroach and field insects. Simple classification of insects according to character of wing.

Grade VIII. Insects of field, Bee.

This is the outline of insect work for the Manitoba teacher in the Public Schools, and is like that for Ontario schools, except that it is more specific—the Ontario outline is expressed in general terms *e.g.*, in Form IV. the work is life histories of conspicuous and economic insects; organs and functions.

With most teachers, even those who have had advantages of University training, there has never been an awakening of interest in insect life—life histories, moths and butterflies, aphids, beetles, larvæ, galls, caterpillars, cocoon, pupa, imago, egg—such terms mean very little, if anything. They are cut off from helping themselves as they may do in other subjects; the work demands actual personal observation if it is to be rightly presented; they cannot read ahead of their classes as in history, geography, and arithmetic and make proper presentation of the subject; it isn't in books, in fact it needs quite another kind of adjustment, a humiliation, a really putting of

oneself into the child's position and attitude. This is hard. No other subject demanded it, the teacher has, in many branches of school work, grown away from the child's atmosphere, but here it is only by becoming as a little child that success may be won.

But while the teacher is learning of insects in this way it is slow, and with the demands of other studies upon him, disheartening; advanced classes will be demanding greater knowledge than patient independent investigation could attend to in many years,—the teachers must be helped; in the multiplicity of text-books there is confusion, even if they should be able to secure them; and many of the books are more hinderance than help on account of being over technical or too exhaustive; the school inspectors can very seldom help much, and without help from books, or superintendent, the teacher may be unintentionally working harm to a good cause; may in striving for the same end in nature study as he does in many other subjects—the acquirement of facts—defeat its chief purpose—the development in our boys and girls of a sympathetic, patient, independent outlook on nature.

The Entomological Society of Ontario and its members can do a great deal to help on the work—as indeed they have done already.

There should be some means adopted by our Department of Education whereby articles such as that of Dr. Fletcher's on the Clover Butterfly, published in the Ottawa *Field Naturalist*, and the articles on economic insects appearing in our Annual Reports, could be put into the hands of every school teacher and school inspector in Ontario, and *free, it has to be free*, and with clear instructions for adapting the work to the schools. There is a large field of usefulness for our *Canadian Entomologist* in offering through the Department of Education special articles in insect studies suited to our schools. At the present juncture, since travelling instructors or local centres of instruction are impracticable, and the University is not helping, these are the best means I can think of for helping our teachers, and our boys and girls in a rather puzzling situation.

NOTES ON THE SEASON 1905 (WESTERN QUEBEC).

By Charles Stevenson, Montreal.

Insect collecting this season has been interesting on account of the quantities of several species of butterflies that appeared. But it has been somewhat disappointing in the captures of rare species and varieties.

In Lepidoptera our old friends *Vanessa atalanta*, Linn., *huntera*, Fab., and *cardui*, Linn., have been very plentiful; in fact in some localities more prominent than the common *Pontia rapæ*, Linn., and *Eurymus philodice*, Godt., the *Albinic* variety of the latter being prominent. Over twenty-five specimens were captured by Messrs. G. Chagnon, E. Denny and myself on the 28th Sept., in a small patch of ground in Outremont, near Montreal. The one-time-common *Anosia plexippus*, Linn., which had almost disappeared last year, showed up more frequently. A fine fresh specimen was caught as late as the 3rd Oct., near Montreal.

Owing to the activity of the collectors this year, four separate localities around Montreal are now known to be frequented by *Stenopis thule*, Strecker,

Great prominence was brought before the public of Montreal by the ravages of the Tussock moths. Three species were found, *Notolophus antiqua*, Linn., *Hemerocampa leucostigma*, S. & A., and *definita*, Pack., *leucostigma*

being the most plentiful and *antiqua* rare. Considerable amusement was given to the entomologists by the ridiculous methods adopted by the authorities to exterminate them, the chief one being to scrape the egg-masses off the trees and leave them on the ground.

Good work has been done by Mr. E. Denny in rearing caterpillars, especially in procuring varieties of *Apantesis vittata*, Fab., and great credit is due to this gentleman for his patience and perseverance in bringing other lepidoptera larvæ to maturity.

Mr. G. A. Moore continues to do good work in the study of Hemiptera.

Messrs. H. H. Lyman, A. E. Norris, and A. F. Winn have continued their studies of the life histories of the *Gortynas*.

Mr. G. Chagnon has made a specialty of the *Buprestidæ* and *Cerambycidæ* of the world, and has built up a collection of these insects which is well worth seeing. At the same time he has not neglected the local fauna of Coleoptera, besides which he has commenced a collection of local *Lepidoptera*, taking particular interest in the *Geometridæ*, in which group we hope to see him have a companion in Mr. G. A. Southee, who has recently become an enthusiastic collector.

It is a pleasure to record the interest that is being aroused among the younger folk, not only in making collections but also in the economic value and the life histories of the specimens they capture. Special mention may be made of the steady work of Masters G. R. Southee, Arthur Denny, T. S. Robinson, H. G. Roche, and Roland Desjardins.

I myself have little to record, owing to my having been severely handicapped by the loss in the spring of my helpmate. However, I have added to my list of local *Blattidæ* several specimens and have been making a special study of ecological entomology, and hope to give my observations at an early date. I may mention, in reference to this subject, that *Sporotrichum globuliferum*, Speg., has been quite epidemic in this locality, and that *flacherie* has dealt great destruction among the caterpillars of *Malocosoma Americana*, Harr.

The following interesting captures may be mentioned:—

Erora laeta, Edw., St. Hilaire, Que., 24th May. E. C. Barwick.

Enodia portlandia, Fab., Mt. Johnson, Que., 10th June. Charles Stevenson. (Fig. 16.)

Apantesis vittata, Mt. Johnson, Que., 10th June. E. Denny. (From which he obtained a batch of eggs, which he successfully brought through to maturity and obtained a splendid series of varieties. He succeeded in mating some of the imagoes and got more eggs, which are now full-grown caterpillars.)

Calosoma scrutator, Fab., St. John's, Que., 30th July. G. Chagnon. (Fig. 17.)

Hydræna pennsylvanica, Kies, St. Anne de Bellevue, Que., 23rd July. G. Chagnon.

Haltica rufa, Ill., St. Hilaire, Que., 27th June. G. Chagnon.

A report of the entomological work of this locality would be incomplete without making an acknowledgment of the lady friends of the collectors, especially Mrs. E. Denny and Mrs. G. R. Southee, for their assistance and encouragement of the insect-hunting hobby.

Fig. 16. Enodia Portlandia, the Pearly-eye butterfly.

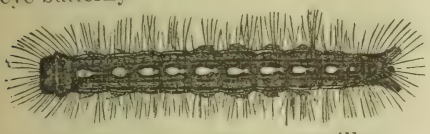


Fig. 18. Forest Tent-caterpillar.

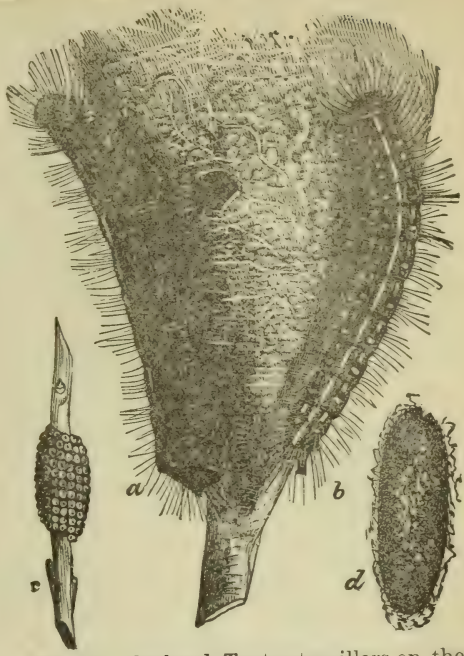


Fig. 19. Orchard Tent-caterpillars on their web : *c* egg-bracelet ; *d* cocoon.

Fig. 22. Cicada : *a* pupa, *b* empty shell, *e* eggs, *d* slits made in twig for eggs, *c* mature Cicada.

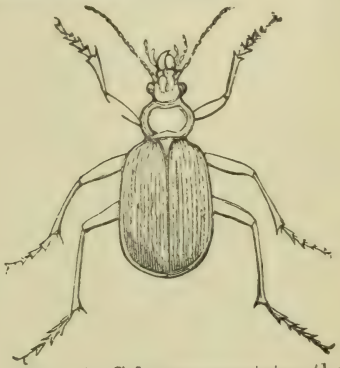


Fig. 17. Calosoma scrutator, the Green Caterpillar-hunter beetle.

Fig. 20. A Hawk-moth (Sphinx) caterpillar.

Fig. 21. Prionus laticollis beetle.

FOREST INSECTS.

By Rev. Thomas W. Fyles, D.C.L., F.L.S., Levis, Que.

Insects fall naturally under two heads.—biting insects, Mandibulata, and sucking insects, Haustellata. To the former belong the borers in the tree-trunks, the twig-girdlers, and the leaf devourers; to the latter, the Cicadas, the scale insects, and the plant lice. It is difficult to tell which of the two orders is the most hurtful to vegetation. In "God's great army" the most insignificant corps becomes occasionally by force of numbers, a formidable array.

In the summer of 1881, the maples presented a strange appearance. Their foliage became brown and withered, as if autumn had come before its time. On examination it was found that countless multitudes of the larvæ of a minute species of moth, *Depressaria acerifoliella*, had assailed the foliage.

The larva of this species bites disks from the leaves and binds them together with a silken filament, so constructing a case for itself. It protrudes its head and forelegs from its case and moves about the leaf, eating away the fleshy parts.

In 1893 another remarkable insect attack upon the maples was witnessed; nearly every leaf of the trees was drawn out of shape—its edges being fastened together with a fine web. Within the tent thus formed was a curious brown case, somewhat in the form of a cornucopia, and snugly ensconsed within the case was a green larva with an amber-colored head. This truly was one of the most economical of insects. Longfellow has said:—

> "O thou sculptor, painter, poet!
> Take this lesson to thy heart:
> That is best which lieth nearest,
> Shape from it thy work of art."

And this larva had used up its exuviae and excrement in forming a case for itself—an inner retreat. The leaf was its shelter and store of food; for it fed upon the parenchyma, and left only the veins and skin. The case was its stronghold. The name of the insect is *Semasia signatana*.

Our native insect pests are bad enough; but the insect foes that we most dread are the foreigners, for the reason that "it is better to deal with the devil you know than the devil you don't know."

The advent of the Larch Saw-fly (*Nematus Erichsonii*) is an old story now. This pest destroyed our tamaracs in the eighties, and it

> "Still goes marching on."

Mr. A. H. D. Ross, in his excellent article on "The Forest Resources of Labrador Peninsula," tells us that of late years the European Larch Saw-fly has destroyed most of the larch between Lake St. John and Lake Mistassini, and the pest is spreading northward.

The Gypsy moth, the Brown-tail moth, and the Leopard moth are new importations to the country to the south of us.

So great a plague has the Gypsy moth been in Massachusetts that the Legislature in four years (1890-4) expended $275,000 in the effort to exterminate it, and had not succeeded; and further appropriations were required.

The larva of the Brown-tail moth is also injurious in Massachusetts, and as their fine barbed hairs are easily detached and carried in the air, they often settle upon the passers-by, work their way into the pores of the skin and cause much suffering. They are greatly to be dreaded.

The larvæ of the Leopard moth are borers. The species has found its way to New York.

In Canada a very common and mischievous pest is the Forest-tree tent caterpillar (*Clisiocampa disstria*). This also flourishes more abundantly some years than others. In 1899 it and its congener, *Clisiocampa Americana*, were so abundant in the Counties of Drummond and Shefford that they stripped the second growth trees bare. Hordes of them crossing the railway brought the train to a standstill, the rails having become slippery with crushed larvæ.

The larva of *C. disstria* (the Forest tent caterpillar) can readily be distinguished from that of *C. Americana* (the Orchard Tent caterpillar). It has a blue head, and a row of silvery spots down the back (Fig. 18), while the other has a black head and a continuous dorsal line (Fig. 19). I consider *C. disstria* the worst of the leaf-eating foes of our hardwood trees.

The larvæ of *Orgyia antiqua* and *Orgyia leucostigma* are handsome but mischievous. They are beautifully tufted along the back. (Fig. 4.) Those of the latter species may be known by their red heads. Both kinds feed upon a variety of forest trees.

The males of these species are called "Vapourers" because of their jaunty flight. They skip hither and thither, as Wood says, "like Cœlebs in search of a wife." The females, on the other hand, are most exemplary in their behaviour. St. Paul, if he had been an entomologist, would have admired them greatly—they "go not from house to house," they stay at home and mind their own affairs. They remain upon the cocoons, from which they crept. There they await their mates; there they lay their eggs; and there they die. But we must not give them too much credit for their domestic virtues. They are aided by the force of circumstances in conducting themselves well—they have only rudimentary wings. (Fig. 7.)

There are a number of large moths, the larvæ of which under peculiar circumstances might become injurious to forest trees. Their very size makes them formidable. (Fig. 20.) The larvæ of the Hawk-moths, *Sphinx chersis* and *Sphinx kalmiæ*, feed upon the ash, though I frequently find them on the lilac. This is not surprising, for both the lilac and the ash belong to the same family of plants, the Oleaceæ, of which the olive tree is the type.

The larva of *Ellema coniferarum* feeds upon the pine. I wish the species were a little more common, for I have only met with one specimen in many years.

The larvæ of *Ceratomia amyntor* feed upon the elm. They have four prominent horns on their shoulders; and Harris on this account gave them the name of *Quadricornis*. There are peculiarities in the form and habits of this species that are well worth notice.

It will be remembered that the leaves of the elm on the under side are strongly and regularly ribbed, and that they are often curled over on one side in a roll. The Amyntor caterpillars are of the same color as the leaf, and along the sides have seven oblique, raised, rough lines. They lie extended along the edge of the leaf, and in that position very closely resemble the roll of the leaves near them. Nor is this all. In the autumn the leaves of the elm become rusty brown in colour, and that the resemblance to the leaves may be maintained, the caterpillars become of the same hue. They afford in this a rmarkable instance of what is called Mimetic Analogy.

The larva of that stately moth, *Triptogon modesta*, feeds upon the poplar, and that of *Cressonia juglandis* upon the black walnut, the butternut and the hickory.

Upon a variety of forest trees, the larvæ of those magnificent Saturnians, *Attacus cecropia* (the largest of our moths), and *Telea polyphemus* are

to be found, whilst those of *Actias luna* (the most beautiful) feed upon the butternut, and those of *Hyperchiria Io* upon the elm, the basswood and the balsam-poplar. The last-named larvæ are set with stinging spines.

In the West the larva of that splendid moth, *Eacles imperialis*, feeds upon the white pine; and the larvæ of *Citheronia regalis*, which has as many horns as the Beast in the Apocalypse, and is locally known as the "Hickory Horned Devil," feeds upon the black walnut, butternut, hickory, etc. I have never heard, however, that the caterpillars of these very large insects have done much damage.

Of insects that injure the roots of the trees, these are remarkable:—

The White Grub: This is the larva of the May Beetle, *Lachnosterna fusca*. (Fig. 6.) The grubs of this species are very general feeders upon the roots of plants. They are said to be injurious to young pines and tamaracs.

A formidable foe to the poplar, basswood and oak, is *Prionus laticollis*, the Broad-necked Sawyer which bores into the roots of trees. As it works underground its ravages are not easily detected. (Fig. 21.)

But of the underground insect foes of the forest trees, the Cicadas are, I think, the worst. Happily this part of Canada is out of the range of *Tibicen Septendecim*, which spends seventeen years at the roots of trees, imbibing at the very founts of vegetable life. But *Cicada canicularis* is very abundant with us. If you go into the woods in autumn you will hear the shrill sound produced by their little tambours or side drums, which vibrate, as the boys say, "for all they are worth." We have another species, *Tibicen rimosa*, but it is not common with us.

The habits of the Cicadas are interesting. The females cut grooves in the twigs of their favorite trees, and in each groove lay a row of eggs. The eggs seem to be nourished by the sap in the twigs, for they become enlarged. The newly-hatched larvæ drop to the ground and burrow till they reach the roots of the trees. Into these they drive their beaks, and then, for three years, live by suction upon the sap. At the end of that time they work their way out of the earth, climb for a short distance up the trees, and then writhe and twist till their skins burst down the back. Out of the rent, in every case, creeps a perfect insect, drawing its legs out of their former enclosures as out of boots. In about ten minutes (I have watched the process) the air has penetrated to every part of the insect's body, its wings have been shaken out of plait into their full dimensions, and the creature is ready for flight. (Fig. 21.)

If you ask me what should be done to check the Cicadas, well, I know what I should do as regards the orchard, the sugar-bush and the enclosed woods. I should in the autumn turn a herd of swine into them. The animals would not only eat the windfall apples, the acorns and beech-mast and fungi, they would grub about the roots of the trees, and devour the immature Cicadas, the White Grubs, and the pupæ of many kinds of flies, beetles and moths. I have seen the experiment tried, and the pigs throve.

But a part of my subject of more interest to lumbermen is that relating to the "Borers"—and truly their name is legion.

A number of beetles belonging to the family Buprestidæ bore in the pine. Two splendid beetles of this family are *Chalcophora Virginiensis* and *Chalcophora fortis*.

C. fortis is the largest and handsomest of our Buprestidæ, and, perhaps, as regards our collections, the rarest. Mr. H. Hague Harrington speaks of it as rare at Ottawa, and I never met with it at Montreal, nor in the Eastern Townships; but one day I was walking under the cliff, at Hadlow, on the south side of the river, when I found specimens of both *C. Virginiensis* and *C. fortis*. There were no trees near in which they could have bred, and the in-

sects were fresh and perfect. The discovery was a marvel to me till, on looking to the river side, I saw, stranded, a crib of pine timber; and then the mystery was solved. This incident shows how easily insects may be spread over the country.

There is a beetle called *Monohammus titillator*. (Fig. 23.) This beetle and its congener, *Monohammus scutellatus* (Fig. 24) make damaging tunnels in the trunks of the pine; and they sometimes turn up unexpectedly in places far from their native forest.

Fig. 23. Monohamus titillator, Pine-borer beetle.

Fig. 24. Monohammus scutellatus.

Fig. 25. Plagionotus speciosus, Maple-tree borer.

The larva of *Plagionotus speciosus* (Fig. 25) is a borer in the maple. That of the fine beetle *Saperda calcarata* bores in the poplar. The Apple-tree borer, *Saperda candida* (Fig 26) works also in the American mountain ash and the thorn. The larvæ of *Saperda vestita*, *Saperda tridentata* and *Cyllene pictus* bore respectively in the basswood, the elm and the cedar (*Thuja occidentalis*).

Time would fail me to enumerate the small beetles which mine between the bark and the white wood, and which at times do much harm—volumes might be written upon them.

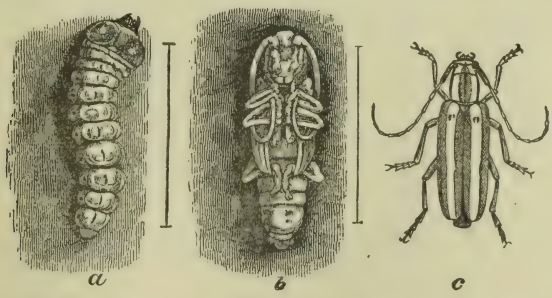


Fig. 26. Saperda candida, Apple-tree borer: *a* grub, *b* pupa, *c* beetle.

But I must not pass over the more important of the Lepidopterous and Hymenopterous borers. Of the former we have remarkable instances; in *Cossus Centerensis*, which bores in the poplar (Fig. 27); in *Prionoxystus robiniæ*, which, as its name implies, bores in the locust, or false acacia; and in *Prionoxystus Macmurtrei*, which Mr. A. F. Winn has found upon oaks on Mount Royal.

The larva of several species of Clear-wing moths are borers; *Sesia acerni* in the soft maple, *Sesia pictipes* in the wild cherry, *Pseudohazis denudata* in the ash.

The Horn-tail, *Tremex columba*, or Pigeon Tremex (Fig 28), is a creature of formidable appearance. It has a stout acuform, but hollow, ovipositor which extends in its sheath from the middle of the underside of the abdomen to a length of half an inch beyond the body. The Tremex drives this instrument through the bark and into the soft wood of the tree (which is usually a maple or a beech), and then, by muscular action, it passes its eggs through the ovipositor to the end of the wound it has made. The Tremex is, in many instances, so exhausted in the process that it has not strength to withdraw its ovipositor, and perishes at its post.

As soon as the young larvæ are hatched they begin to tunnel in different directions, enlarging their passages as they grow.

Other Horn-tails of like habits to the Tremex are *Sirex albicornis*, *Sirex flavicornis*, and *Paururus cyaneus*, and these assail the pine.

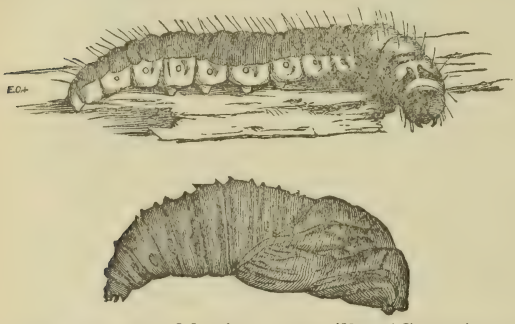


Fig. 27. Wood-boring caterpillar (Cossus) and chrysalis.

Fig. 28. Pigeon Tremex — the Horn-tail borer.

It must not be supposed that nature has left these borers to multiply and work their will without a check. If she had, the forests would have disappeared long ago. No—a number of formidable Ichneumon flies, with yet longer ovipositors, are engaged in reducing the hosts of the enemies.

Indeed every kind of destructive insect has its foes. Insectivorous birds and predaceous insects, under ordinary circumstances, keep the spoilers within bounds. And man may give his assistance to nature to the same end. For instance, he can preserve the woodpeckers and the soft-billed birds. The man who would shoot a woodpecker ought to be ostracized. I wish I could hear more frequently the hearty laughing call of that noble bird the Bonneted Woodpecker, *Picus pileus*. Alas, its beauty has been to it a "fatal gift." It has drawn the attention of the fowler.

There should be a law forbidding juveniles to carry guns. There is this to be said, these gun-bearing boys lessen their own numbers. Many a young rascal will go into the woods and think he has done a clever thing if he has brought down a Wakeup or a Tom-tit.

When a tree is found with Horn-tails affixed in the position I have mentioned, it may be known that that tree is doomed; it should be felled and split up for stove-wood.

The proper and timely burning of brush-piles will do much to lessen the numbers of insects. Brush should be burned, not when the ground is covered with dry herbage and dead leaves, but when vegetation is lush and green, and then the fire and smoke would destroy their thousands of insect pests.

In Europe in former days foresters were men of standing and importance. It seems to me that it would be a good thing if our Government would appoint in every county in which lumbering operations are being carried on and settlements made, Government foresters, intelligent men of high character, allowing them such assistance as might be required. Their duties should be to preserve the game, destroy the wolves, regulate the burning of the debris of the lumber camps and clearings, see to the due observance of forest laws, and generally to conserve woodland interests.

I think that such officers would have many important duties to perform and that their life would be full of interest and attraction.

THE ADVANTAGES AND DISADVANTAGES OF THE CANADIAN ENTOMOLOGIST.

Rev. Thomas W. Fyles, D.C.L., F.L.S., Levis, Quebec.

The youthful entomologist in England, in the forties and fifties of last century, was a privileged person—he enjoyed many advantages. Kirby and Spence were both living in the earlier half of the period mentioned. Kirby died on the 4th of July, 1850. In 1856 Spence brought out a cheap edition of the "Introduction to Entomology," and, in four years, 10,000 copies of the work were sold. This work did more than any other to popularize the study of entomology.

Those were the days of Newman, Stainton, Waterhouse, Douglas, Westwood, Morris, Wollaston, Wilkinson, and other lights. Van Voorst was publishing works on Natural History. Newman was carrying on the "Zoologist," and Stainton the "Weekly Intelligencer." There was an abundance of cheap yet valuable literature for the rising entomologist.

The comparatively small extent of the British Islands brought the number of species—say of the *Lepidoptera*—within the mental grasp of the diligent student. How different is it with us now, on this vast continent of North America! A crown-octavo volume of 723 pages is now required, for a mere list of the Lepidoptera with its index.

England in those days was a very paradise for entomologists. The plantations and hazel-copses for the preservation of the game, the open woods of—

> . . . . "tall ancestral trees
> O'er all the pleasant land,"

the withy-gores, the fens, the moors were all famous hunting-grounds.

It was a privilege to take part in an "outing" at some appointed place. To wander along the forest paths alive with Marbled Whites and Silver-washed Fritillaries, till the waving nets shewed the spot where the Entomologists were gathered together. The excitement of the chase, the refection in the shade of the trees, the pleasant conversation, the comparison of captures, were things to be remembered. So were the multitudinous voices of the birds that made the woodland ring. England is rich in song-birds; and linnets, goldfinches, bulfinches, yellowhammers, black-caps, white-throats, robins, blackbirds, thrushes, and others, seemed to greet the woodland visitors in one full tide of song.

I remember an effusion that I sent to the "Weekly Intelligencer," after such an outing. It ran:—

"Come to the wild woods, come away,
Now the sun is bright in the month of May.
And the mated birds, in boist'rous glee,
Fill the wide heavens with harmony;
Now the breezes shake the hyacinth bells,
And the pale anemone whitens the dells,
And young leaves whisper soothingly,
And all is joy and light and love—
For the azure heaven is smiling above,
And the green earth laughs for sympathy.
Come where the Hair-streak* flutters by
Like a living leaf; where the butterfly†
Whose snowy wings are dash'd with green,
And with rich orange tipp'd, is seen;
Where the Chequer'd Skipper,‡ as you tread,
Springs lightly from his grassy bed;
And Clouded-border Moths§ unfold
Their tender wings of speckled gold;
Where *Fuciformis* quivers round
The stems with honeysuckle bound;
And, like a fragment from the sky,
Sweet *Alexis* gambols by;
Where *Falcula*, whose hooked wings
Have eye-like spots, to the birch leaf clings;
While near it, where the catkins play,
Papilionaria larvæ stray,
Mid forms like their own safe to be
From prowling *Ichneumonidæ*,
From the busy tit that twitters near,
And other foes they have to fear.
Oh, come to the wild woods, come away,
Now the sun is bright, in the month of May!
Come, for a thousand sights shall cheer
Your eye—a thousand sounds your ear!"

In Canada the brethren of the net are too widely scattered, the claims of business are too urgent, the mosquitoes too troublesome for such gatherings to be very frequent, very numerously attended, or very thoroughly enjoyable.

But, notwithstanding, the sugar-woods, the intervales, the neglected bottom lands of this country, the orchards, where the owners are better farmers than fruit growers, are all fine hunting-grounds.

On the 16th of August I discovered an undrained hollow in which was a thick growth of dwarf willows, sedges and flags. It was richly bordered with asters, Joe Pye Weed and Golden Rod, in full bloom. The multitude of insects clustering about the flower heads was truly astonishing. The Painted Ladies were much in evidence. *Pamphila Manitoba* was there; and there was a great show of Humble-bees, wasps, ichneumons, dragon-flies, flower-flies, etc. I spent a very profitable hour amongst them.

Bombyces were scarce in the collections of former days. We have an advantage now that was undreamed of when I was a boy, viz., the electric light. Many of the gems of our collections have been taken at this light. So late as the beginning of this month (October, 1905), I was passing by a warehouse on the Louise embankment late at night, when I saw, under an arc-light, a fine specimen of *Lophodonta ferruginea*, Pack, and one of *Charadra deridens*, Gn. I had no cyanide bottle, nor chip boxes, with me;

*Thecla rubi.
†Anthocharis cardamines.
‡Thymele alveolus.
§Venilia maculata.

but the specimens were near together; and I swept them into my hat, and clapt it quickly upon my head. They were fidgety for a while, but soon quieted down and went to sleep; and on reaching home I transferred them to the cyanide-bottle.

Speaking of the cyanide-bottle: how great an improvement its use is to the old method of killing insects. Many a man, in the days I have spoken of, fixed a sheet of cork in the crown of his hat, and a supply of pins in the lapels of his coat; nipped his captures smartly under the wings with the tips of his thumb and fore-finger; pinned them ready for setting, and then stowed them away in his hat.

My own plan was to carry a small vial of chloroform and a few pieces of twine about two inches long in my vest pocket, and a few nests of chip-boxes in a special pocket of my coat. When I had boxed a specimen I slipped in one of the pieces of twine wet with the chloroform, to send it to sleep; and when I reached home I gave it its final quietus by piercing it under the wings with a steel pen dipped in a solution of oxalic acid. I found this a good plan, and I often make use of it still.

Before the cyanide-bottle was fairly established, men tried various expedients,—bruised laurel-leaves, formic acid, etc. One entomologist advocated, in doggerel verse, a new agent:—

"An agent nothing can surpass,
Will insects instant kill,
For preservation, too, as well,
This wondrous agent let me tell,—
Five drops, or ten, of nothing but
Essential oil of cajeput."

W. H.

There are many advantages now open to the Canadian entomologist, for which he may consider himself highly favored. There is the great advantage of having so able and obliging a scientist as Dr. James Fletcher of the Department of Agriculture, to consult in his difficulties—one from whom he may feel sure of receiving a courteous reply to his enquiries, and valuable information.

Again, the privilege is open to him of membership in the Entomological Society of Ontario, either directly with the parent stem, or through one of its branches. And in this connection, I congratulate Professor Sherman and the members of the newly-formed Branch in Guelph. One of the helps they will receive in their studies will be the receipt monthly of the *Canadian Entomologist*, a publication in which Dr. Charles J. S. Bethune has built, and is still building—and long may he continue to build— a monument that will preserve his name as long as entomologists shall be found in Canada—which I trust will be till the end of time.

The annual meetings of the Society present opportunities to be highly prized. "Like as iron sharpeneth iron, so doth the countenance of a man his friend;" and we cannot attend the meetings of this Society without feeling encouraged and stimulated.

A meeting that will be remembered with special pleasure is this present gathering. The noble institution in which we are assembled, and its beautiful surroundings; the kindness of Principal Creelman and the members of his staff; the presence with us of Professor J. B. Smith; his wonderful description of the mosquito and its habits, so beautifully illustrated, will all afford us delightful reflections.

Who amongst us has not known Professor Smith by his works? It is good, now, to look upon his face, and listen to his voice, and feel the warm grasp of his hand.

I made the acquaintance of the mosquito years ago, off Anticosti. I saw the little brute alight upon my hand, and I watched it swell and change color from grey to crimson, with some amusement; but the results taught me that such pleasures could not be indulged in with impunity. Nevertheless, as I listened to Professor Smith last night, I almost longed to be wading knee-deep in those delightful swamps he showed us, and assisting those worthy fellows who were bagging the peddlers of malaria and yellow fever.

Lastly, what advantages the modern student has in the number of admirable works, upon every branch of entomology, that have appeared of late years. Among them are Harris's Insects Injurious to Vegetation, Packard's Guide, Saunders' Insects Injurious to Fruits, Smith's Insects of New Jersey, Ashmead's Proctotrypidæ, Holland's Butterfly and Moth Books, Howard's Insect Book, Edwards' and Scudder's respective works, the valuable series of Bulletins issued from Washington, Albany, and other points of observation, not omitting Ottawa.

May the Entomological Society of Ontario flourish! May its new Branch, the Guelph Branch, bourgeon, and blossom, and bring forth fruit to the benefit of the general community, and for many a day!

ORTHOPTERA AND ODONATA FROM ALGONQUIN PARK, ONT.

By E. M. Walker, B.A., M.B., Toronto.

The following list of Orthoptera and Odonata is based chiefly upon collections made by the writer during two canoe trips in Algonquin Park, and the vicinity of Dwight, a few miles to the south-west of the Park limits. The first trip was made during the second and third weeks of August, 1902, while the second occupied the latter half of the same month in 1903. To the list of Odonata are added the names of a number of species taken by Prof. John Macoun in July, 1900, and also those of many specimens, especially nymph exuviæ, collected by Mr. Paul Hahn during August, 1904.

I wish to express my thanks to Prof. J. G. Needham for his kindness in determining some of the more difficult species of Odonata.

As August is rather late for most Dragonflies, although it is the height of the season for Orthoptera, the list of the former is by no means a representative one, but will give some idea of the dragonfly fauna of the region. It probably contains less than two-thirds of the number of species native to the district, whereas the list of Orthoptera doubtless includes more than three-fourths of the total number of species to be found there.

The country traversed is an ideal one for dragonflies, abounding in lakes and streams, which vary in their course from the most placid weed-grown reaches to the swiftest rapid. The north branch of the Muskoka River, which was our chief highway in both trips, is a very characteristic stream. In some parts of its course its surface is perfectly smooth for miles at a stretch, the shore low and fringed with alders, with a background of

luxuriant balsams and spruce; in the other parts there are rocky, turbulent rapids, and the banks are much higher with a much more varied vegetation. In other places, again, the rapids are smoother and shallower, with gravelly bottoms, and there are steep sandbanks on either side. Each kind of locality has its peculiar species of dragonflies, more species apparently being found about the gentle rapids than elsewhere.

Algonquin Park, which covers an area of about 1,600 square miles just north of the Muskoka District, lies at the extreme northern limits of the Transition life zone as it passes into the Boreal zone. Many forms of plant and animal life found within its limits do not belong to the Boreal zone in a restricted sense, but on the whole the flora and fauna are of a Boreal type. In the partly cleared and cultivated country in the vicinity of Dwight, lying to the south-west of the Park limits, several species of insects belonging to the Transition and Austral zones were met with, which did not appear within the Park limits. Among these are the following Orthoptera:

Spharagemon Bolli, Scudd. A single male of average size was taken at Dwight. This locust belongs to the Austral and warmer parts of the Transition zones, and becomes smaller in the northern part of its range. It is abundant and of large size in the Austral strip along Lake Erie, but becomes smaller and scarcer at Sarnia and Toronto, north of which I have never before taken it, except a single female from Peterboro' County.

Mecostethus lineatus, Scudd. This species was found among the sedge bordering a small lake in a brulé near Dwight. It belongs to the Transition and northern parts of the Upper Austral zones, and is replaced in the Boreal by its ally, *M. gracilis*, Scudd., whose range in Ontario overlaps that of *lineatus* considerably, as it extends southward to the watershed between Lake Simcoe and Lake Ontario. *M. gracilis* was not found in the Park, but doubtless occurs there.

Orchelimum vulgare, Harr. This grasshopper was found in small numbers in the fields about Dwight, but did not appear in the Park, nor could I find it at North Bay, Lake Nipissing, in September, 1900, although the proper surroundings apart from the northern latitude were apparently often met with. This species and *Conocephalus ensiger*, Harr., are enumerated by Scudder among the Alpine Orthoptera of the White Mountains (Appalachia, VIII., No. IV., p. 19). Their range seems to stop short of the Boreal zone in Ontario and I found the same to be true in Quebec.

Scudderia furcata, Brunn. A single male was taken near Dwight. It ranges at least as far north as Lake Nipissing, but I doubt its being a truly Boreal form. It is much commoner southwards.

Except the above species, all of which were taken near Dwight, outside the Park limits, and possibly another (*Nemobius palustris*, Bl.), whose range is not yet well enough known, all the Orthoptera in the list are inhabitants of the Boreal zone. *N. palustris* has elsewhere been taken only in the peat bogs of Northern Indiana, where several northern Orthoptera occur.

Of the Odonata, the comparatively large number of Cordulinæ, despite the fact that their season was practically over, testifies to the Boreal character of the dragonfly fauna. Most of these Cordulinæ are represented by nymphal exuviæ only. But one dragonfly, *Celithemis elisa*, Hagen, taken near Dwight, did not appear within the Park limits. I have never before seen it so far north. It is fairly common in the Austral and lower part of the Transition zones in Ontario.

The absence of *Libellulæ* I do not regard as significant of anything but the rather late season in which most of the collecting was done, and the character of the bodies of water met with.

Orthoptera.

Acridiidæ.—

1. *Tettix granulatus* (Kirby). Common in damp places in woods.

2. *Tettix acadicus* (Scudd.). Several specimens of what seems to be this species were taken beside a lumber road through a hardwood forest, August 20, 1902.

3. *Tettix Handcocki*, Morse. A number of long-winged examples taken from a patch of wild strawberry, lichens and short grass growing on sandy soil in a bushy field, September 2, 1902.

4. *Tettigidea parvipennis* (Harr.). Immature specimens were found on low marshy parts of the river shore.

5. *Chlœaltis conspersa*, Harr. Common in the drier parts of open woods.

6. *Stenobothrus curtipennis* (Harr.). Very abundant in low places wherever long grass occurred.

7. *Mecostethus lineatus* (Scudd.). A few were found flying about the sedge bordering a small lake near Dwight, August 23, 1903.

8. *Chortophaga viridifasciata* (De Geer). Young nymphs were found on the grassy hillsides near Dwight.

9. *Camnula pellucida* (Scudd.). Common everywhere in dry, open places in the woods and in clearings

10. *Dissosteira carolina* (L.). Common about Dwight and occasionally seen in clearings in the Park.

11. *Spharagemon Bolli*, Scudd. One male from a dry, grassy hillside at Dwight, August 23, 1903.

12. *Circotettix verruculatus* (Kirby). Common in clearings in the Park and on sandy beach at Dwight.

13. *Podisma glacialis Canadensis* (Scudd.) Walk. A common and very characteristic species, found on bushes in open woods. The specimens are smaller than those taken at North Bay on September 12, 1900, and approach the race *variegata* more closely.

14. *Melanoplus Bruneri*, Scudd. This species was found in considerable numbers in two or three limited areas near Dwight. They were found on patches of short grass and strawberries on sandy soil. September 2, 1902, one male. August 10, 1903, many specimens.

This is a western form, occurring with two or three closely allied species in the Boreal zone of the Rocky Mountain region from Alberta to New Mexico.

In my List of Ontario Acridiidæ I determined it somewhat doubtfully as *Bruneri* from a single male, but in 1903 a number of specimens were taken and I have since been able to compare them with Scudder's types of *Bruneri*. In these the pronotum is slightly narrower and more elongate than in the majority of my specimens, but the distinction does not hold good throughout the series and there seem to be no other characters of sufficient importance to justify the creation of a new species for my specimens. They are considerably larger than the few in the Scudder collection except one male from New Mexico.

M. Bruneri is probably a Boreal form extending across the plains or to the north of them.

15. *Melanoplus atlanis* (Riley). Abundant in the open sandy country about Dwight, and generally common in clearings.

16. *Melanoplus islandicus*, Bl. Common in paths and openings in woods everywhere. A very characteristic sylvan species often associated with *P. glacialis canadensis*.

17. *Melanoplus fasciatus* (Walk.). A few were taken in open woods at Whisky Falls, North River, and it was occasionally met with elsewhere, but not commonly.

18. *Melanoplus femur-rubrum* (De G.). Common in open, grassy clearings and in open marshes.

19. *Melanoplus luridus* (Dodge). Abundant on dry hillsides and scrubby fields, on sandy soil near Dwight, and occasionally seen in clearings in the Park.

There seems to be no doubt that *M. collinus*, Scudd, and *luridus* are synonymous.

20. *Melanoplus bivittatus femoratus* (Burm.). Common everywhere in rank grass in low places.

Locustidæ.—

21. *Scudderia furcata*, Brunn. Dwight, August 23, 1903, one male.

22. *Scudderia pistillata*, Brunn. Common on bushes in open woods in the Park. Our most characteristically Boreal Locustid.

23. *Orchelimum vulgare*, Harr. A single male was taken and a few others heard shrilling in clumps of tall grass in fields about Dwight.

24. *Xiphidium fasciatum* (De G.). Very common in open, grassy places everywhere.

25. *Xiphidium brevipenne*, Scudd. In rank grassy places, not very common. None were found at North Bay.

26. *Ceuthophilus pallidipes*, Walk. A great deal of careful searching was done for *Ceuthophili*, but not a single individual was found during the first canoe trip. On August 20, 1903, however, a nearly full-grown male of this species was found under a rotten log at Ragged Lake. A few very young *Ceuthophili* were also observed beneath stones beside a lumber road.

Gryllidæ.—

27. *Gryllus pennsylvanicus*, Burm. This species occurred sparingly throughout the Park.

28. *Gryllus abbreviatus*, Serv. Small-sized specimens were common in the fields about Dwight. I am still doubtful about the separation of these small northern individuals from *pennsylvanicus*, but they seem to pass through every gradation into the typical large *abbreviatus* of the Austral zone.

29. *Nemobius fasciatus* (De G.). Common everywhere in open grassy places. The small black variety, *abortivus* Caudell, was often met with in the Park.

30. *Nemobius augusticollis*, Walk. This species, by an oversight, was not collected, but its shrilling, which is easily recognizable when once known, was often heard along the banks of the North River. Unless abundant, it is very difficult to find. It is a common northern species.

31. *Nemobius palustris*, Bl. On August 18, 1903, I found this little cricket in considerable numbers in a floating sphagnum bog at the mouth of a creek flowing into Ragged Lake. (See Can. Ent. XXVI., 1904, 185.) It was the only Orthopterous insect found in the bog, except a few *Melanoplus femur-rubrum* in the more solid parts.

32. *Œcanthus fasciatus*, Fitch. Common on bushes and tall herbaceous plants in open places.

Odonata.

Zygoptera.—

Calopterygidæ.—

1. *Calopteryx maculata* (Beauv.). Common on the river, flying along the shore amid the luxuriant vegetation.

2. *Calopteryx aequabilis*, Say. In 1902 I saw four or five of this species along the river, but captured only one, a male. In 1903 nine were seen. Among Prof. Macoun's specimens there are two fresh males dated July 6th and 25th, 1900. They are probably much commoner at that season.

Agrionidæ.—

3. *Lestes congener*, Hagen. Common in open woods and marshes.

4. *Lestes uncata*, Kirby. A single male from the North River, dated August 13, 1903.

5. *Lestes forcipata*, Rambur. Two males from the North River, August 13, 14, 1903.

6. *Lestes rectangularis*, Say. Common in swamps and open woods. It was common in an open sphagnum bog at the mouth of a creek emptying into Ragged Lake. They were associated with *Ischnura verticalis* and teneral examples of *Sympetrum vicinum*.

7. *Argia putrida* (Hagen). A number of specimens were taken by Mr. Hahn from July 15th to 21st, 1903, and 1904. I have also a badly broken teneral specimen taken by Prof. Macoun, July 6, 1900.

8. *Argia violacea* (Hagen). A pair were taken at Smoke Lake, August 17, 1903.

9. *Enallagma Hageni* (Walsh). Very common in open marshes and flying over the river in the smooth parts.

10. *Enallagma ebrium* (Hagen). One male taken by Mr. Hahn.

11. *Enallagma exsulans* (Hagen). A pair from Little Joe Creek, taken *in coitu*, August 29, 1902. Another male taken by Mr. Hahn in 1903.

12. *Ischnura verticalis*, Say. Common in marshy places bordering lakes and streams.

Anisoptera.—

Æschnidæ.—

13. *Ophiogomphus rupinsulensis*, Walsh. This fine green species was quite common on the river, flying over the shallower rapids and frequently settling on the exposed pebbles.

14. *Hagenius brevistylus*, Selys. Four males, all somewhat worn, were captured along the river. Two were taken by Mr. Hahn with one sweep of the net while flying over the water, August 22, 1903. Another was taken while resting in a path in the woods close to the river, August 20, 1903. In addition to these two nymph exuviæ were found on the rocks on the shore of Oxtongue Lake, August 10, 1903.

15. *Lanthus albistylus* (Selys). This dainty little Gomphine was fairly numerous locally over rapids. They were difficult to approach and only one male was taken (August 10, 1903).

16. *Gomphus brevis*, Hagen. A worn female was captured on the river at Whisky Falls, August 20, 1903, and a few minutes afterwards a male, also worn, was taken at nearly the same spot. Two nymph skins were found on the logs of a timber slide at the upper end of Ragged Lake.

17. *Gomphus exilis*, Selys. This nymph skin was found on the timber slide at Ragged Lake. Several others were found by Mr. Hahn on a log hut at the edge of Smoke Lake.

18. *Gomphus Scudderi*, Selys. This striking species was common on certain parts of the river, usually where there was a considerable current, but where the water was fairly deep. It was not so often seen over the swift rapids. They were usually moving along slowly with swiftly vibrating wings, every now and then making a dash to another spot. They would

sometimes alight on the canoe. Only one female was taken, but quite a number of males.

19. *Gomphus plagiatus*, Selys. A nymphal skin was found on a muddy part of the river shore just below a rapid.

20. *Boyeria vinosa* (Say). This was the most abundant of all the larger dragonflies along the river, but was never seen away from the water. It was most common on the smoother parts and had the curious habit of following the canoe, sometimes hovering close to the gunwale. A few nymphal skins were found by Mr. Hahn.

21. *Æschna constricta*, Say. A male was taken on Little Joe Creek, August 29, 1902, a pair from the North River, August 14, 1903, and a few females at Dwight, August 23, 1903. Much less common than the next species.

22. *Æschna clepsydra*, Say. The commonest Æschna in this locality; plentiful in openings in the coniferous woods, frequently settling on the trunks and branches of the spruce trees and balsams. A female was taken while ovipositing. She was resting on the edge of the shore with the end of the abdomen immersed in the water among a few aquatic plants.

23. *Æschna verticalis*, Hagen. Associated with the preceding, but apparently less numerous. A number of Æschna exuviæ were found by Mr. Hahn, but it is not known to what species they belong.

Libellulidæ.—

24. *Macromia Illinoiensis*, Walsh. A nymphal skin was found by Mr. Hahn. The imagoes were occasionally seen patrolling the river, but would swoop past the canoe and disappear so quickly that it was quite useless to attempt their capture.

25. *Didymops transversa* (Say). A nymphal exuvia was found on the rocky shore of Oxtongue Lake, some yards from the water. Several others were found by Mr. Hahn along the river.

26. *Neurocordulia* (sp.). About a dozen exuviæ were found upon the side of a timber slide at the upper end of Ragged Lake, August 17, 1903. They were mostly from two to four feet from the ground, of which there was a narrow strip between the timber slide and the water. Another was found by Mr. Hahn at Canoe Lake.

Prof. Needham, to whom I sent one of the skins, says they do not belong to *N. obsoleta* (Say), the only species of *Neurocordulia* which has been bred, and may be *N. Yamaskanensis* (Pro.), which occurs in Quebec.

27. *Epicordulia princeps*, Hagen. A single nymphal exuvia was found by Mr. Hahn.

28. *Tetragoneuria semiaquea*, Burm. One male taken by Prof. Macoun, July 6, 1900. I found the exuviæ in considerable numbers on the timbers of a log hut at the lower end of Smoke Lake. The hut was built on the shore of a shallow bay connected with the main body of the lake by a rather narrow passage. The bay was full of pond-weed (*Brasenia peltata*), and other aquatic plants and was doubtless a fine breeding-ground for Odonata. Skins of *Helocordulia Uhleri* and *Gomphus exilis* were also found on the hut.

29. *Tetragoneuria cynosura* (Say). Skins of this species, according to the distinctions given by Prof. Needham, were also found.

30. *Tetragoneuria spinigera* (Selys). Two exuvia of this genus with the lateral spines of the ninth segment considerably more divergent than the others probably belong here.

31 *Helocordulia Uhleri* (Selys). Two exuviæ taken from the log hut on Smoke Lake and a number from Canoe Lake.

32. *Somatochlora elongata*, Scudd. Two males were taken, one at the marshy bay at the lower end of Smoke Lake, August 17, 1903, the other from a lumber road which runs through the woods close to the North River, August 20, 1903. Many others were seen flying over the river and in the woods, but they are almost hopeless to catch, as they fly very high.

33. *Somatochlora forcipata* (Scudd.). A male of this rare species was taken by Prof. Macoun, July 15, 1900.

34. *Cordulia Shurtleffi*, Scudd. A single nymphal skin was found by Mr. Hahn upon a boat-house on Canoe Lake, August 15, 1904.

35. *Celithemis elisa* (Hagen). A single fresh male was captured at Dwight by Mr. Hahn, August 23, 1903.

36. *Leucoshinia frigida* (Hagen). Two females, taken by Prof. Macoun at Catfish Lake, July 26, 1900.

37. *Sympetrum vicinum* (Hagen). Very common at Dwight on September 2, 1902, and in the cranberry bog at Ragged Lake. Also seen occasionally in other marshy places. Many of the specimens seen were tenerals.

38. *Sympetrum semicinctum* (Say). Four males and one female taken by Prof. Macoun, July 23 and 25, 1900. Three of these are labelled Catfish Lake. I found them quite numerous at one spot on the upper end of Ragged Lake near the timber slide (August 17, 1903). I also saw one on Little Joe Creek. They seem to be local.

39. *Sympetrum rubicundulum* (Say). Very abundant everywhere. A number were taken by Prof. Macoun in July.

40. *Sympetrum obtrusum* (Hagen). Very common everywhere. I took more examples of this species than the preceding, but in Prof. Macoun's series there are more of *rubicundulum*.

41. *Ladona Julia*, Uhler. A male was taken by Prof. Macoun, July 5, 1900.

BUTTERFLY COLLECTING IN CANADA, 1904.

By Mrs. Nicholl, Bridgend, South Wales.

I will not weary you with a long account of my last year's collection of butterflies, because the insects that I brought home do not represent, even tolerably, the Lepidoptera of British Columbia.

I hope to return there next summer and to collect in the south-west corner of the Province, and also, if possible, to explore the north-western part of Washington Territory at the head of Lake Chelan, including a part of the Cascade Range. I believe that the "dry belt" of British Columbia, sometimes known as the Rattlesnake Belt, comprising the district south of Lake Okanagan and Arrow Lake, is perhaps the extreme northern limit of many southern species—which would be met with in typical perfection south of the boundary line. Arriving at Montreal May 22nd, I went direct to Ottawa. Here I had the pleasure of making acquaintance with the well-known Canadian entomologist, Dr. Fletcher, of the Government Central Experimental Farm, whose kind advice and assistance I found invaluable. He provided me with all the maps extant of British Columbia, gave me several introductions, and further, entertained me with a delightful day's collecting in the lovely Canadian woodlands near Ottawa. The season was late and we only took eight species of butterflies on the 24th of May, although the weather was perfect. I next went westwards to Calgary, situated amid the lowest foothills of the Rockies, and Mr. Wolley Dod hospitably entertained me at his ranch, 18 miles south-west of Calgary. Here I spent two days very

agreeably, and was much interested by Mr. Wolley Dod's fine collection of local moths and butterflies. But the weather was unfavorable, and I caught very few insects. I failed to get the local prize, Chionobas (*Œneis*) Alberta, which has, of late years, become very scarce. It formerly swarmed all around Calgary. I took Ch. varuna, E. discoidalis, and a few other insects. My next halt was at Banff, where I had a fine day and secured good specimens of Brenthis Freija and B. frigga, besides one solitary Euchloe creusa which I never met with anywhere else. I also got a last ragged straggler of Thecla eryphon high up among the pines.

June 4th found me at Victoria, where I remained for two days, and had rather indifferent weather. I here took Papilio eurymedon, P. rutulus, and Basilarchia Lorquinii, besides a few less remarkable butterflies. The woods swarmed with Cyaniris pseudargiolus. I took a great number, but all much rubbed.

June 7th, I went to pay a visit at a ranch on the mainland two miles north of the boundary line and about three miles from the sea. Here, again, weather was indifferent, but I was lucky enough to take Parnassius clodius, Papilio zolicaon (the only one I ever met with), and Phyciodes pratensis var Orseis.

Taking the C.P.R. eastwards from New Westminster, I went to Sicamous, and thence by rail and steamer down the hundred-mile-long Lake Okanagan to Penticton, where I came into the "dry belt," and found glorious weather. South of the Okanagan, Arrow and Kootenay Lakes, I spent the remainder of June, and caught a great many butterflies; of which the best is Erebia Vidleri—hitherto supposed to be peculiar to Mt. Cheam, on the Fraser—appearing in August. I did not know what it was when I took it in the valley of the Upper Keremeos, about twenty miles south-west of Penticton and over one hundred miles south-east from Mt. Cheam, at an elevation of 4,000 feet, in mid-June.

Holland does not mention the species at all, and I did not appreciate my good fortune and wait for the female to appear, as I expected to find it again elsewhere. In the Upper Keremeos I also took Chrys, zeroe, Lycæna sagittigera, and one ragged specimen of Thecla spinetorum, whilst higher up Brenthis frigga and B. freija were abundant. Close to the boundary, south of the mining town of Greenwood, Colias Alexandra v. Emilia was very common, and the same grassy slopes produced numbers of the lovely L. Acmon, L. heteronea and Melitæa chalcedon. On the mountain above Greenwood I again took P. clodius—perhaps at its most eastern limit. Near Nelson I took V. California, Thecla sæpium, and other interesting butterflies. From Nelson I went up Lake Kootenay to Kaslo, where I arrived June 30th, and found good quarters in the excellent hotel of a very keen entomologist—Mr. Cockle. I remained in this district for a week. Colias interior was probably my best catch. I also got a great many Argynnis, all of three species, Monticola, Atlantis, Eurynome and var. Clio, showing considerable variation; 2 specimens of Lycæna anna, and one high mountain Lycæna, which Mr. Cockle considered to be Podarce, but I fail to see any difference between that specimen and the series which I took, later on, at Lake Louise, and which Mr. Elwes pronounces to be Aquilo.

Mr. Cockle has a good collection of local Lepidoptera, and sent home by me some rare and interesting insects for the collection at the British Natural History Museum.

On July 11th, I went to Glacier, in the Selkirks, 4,000 feet above the sea. The weather was tolerable, but there were very few butterflies about, a few Brenthis epithore and Pamphila mandan—the American name for C. Palæmon), being all that I saw in two days.

On the 14th July I met Mr. Wolley Dod at Lake Louise, where there is a beautifully situated mountain hotel (altitude 6,000 feet) two miles from Laggan. Here we spent a week, of which the first four days were dull, cold, and miserable, with very occasional gleams of sun and frequent storms of hail and sleet; then came three days of perfect weather, such as the mountaineer and butterfly hunter dreams of for years afterwards. We made the best of our luck. B. astarte, B. alberta, Ch. Beani, Chrys. Snowi, Lycæna aquilo (Orbitulus var Franklini), Colias elis, C. nastes, and others, filled our boxes to overflowing.

On the 25th, Mr. Wolley Dod returned home, and I went into camp at Hector, just at the summit of Kicking Horse Pass (5,190 feet). I spent the remainder of the summer camping in the Rockies.

I thoroughly worked the Lake O'Hara district, on the south-western side of the great mountains whose northern precipices enshrine Lake Louise and her sister lakes. Then, returning eastwards to Banff, I went three days' march (about fifty miles) south-westwards to Mt. Assiniboine, a splendid peak 11,800 feet high, just west of the Divide, and the southernmost outlier of the glacier fields of the northern Rockies. Here I spent five days, in fine weather, though the nights were frosty, and then a week's march brought me to Field, and I encamped at Emerald Lake, about eight miles north of Field, and well on the western slope of the Divide. Here we were close to the Yoho Valley, where there is a National Park reserve and splendid scenery. It was August 19th, when three days of bad weather set in, which delayed me, and killed the butterflies. For although we afterwards had five splendid days in the Yoho, and made excursions right on to the great Wahputek glacier, I caught very little. A battered B. astarte, a much-worn B. alberta, a few Colias minismi, and several fresh Grapta zephyrus were all my captures.

I greatly regret my late arrival in the Yoho, as I believe that earlier in the season I might have found different insects to those I caught on the summit and eastern side of the Divide. Prof. Macoun, the celebrated botanist, told me that during two days' plant collecting around Field he gathered no less than forty-two species of plants which do not grow east of the Kicking Horse Pass, and the same variety might probably occur among the Lepidoptera.

Around Lake Louise, Lake O'Hara, and Lake McArthur, all high Alpine lakes, surrounded by glacier mountains, I took much the same butterflies, more or less commonly. Mt. Assiniboine afforded some variety. I took Parnassus smintheus var. Behri only at Simpson's River, about twenty miles north of Assiniboine, in a steep gorge with rock faces, above tree level. B. amphirape (or myrina) swarmed on the wet ground near Lake Assiniboine. Everywhere Brenthis astarte was to be seen (though not generally to be caught) on every rocky peak over 8,000 feet, and Brenthis alberta was equally well distributed at a rather lower level. With Astarte, on the highest summits, Ch. Beani was invariably abundant, and Chrys. Snowi shared the haunts of Alberta, only it was rather less common. Ly. aquilo was to be had still lower down, rather local, but very common where it occurred. It fairly swarmed on the damp path at the head of Lake Louise, and on a warm and very steep slope above Lake O'Hara. Colias minismi was very common everywhere on grassy slopes from 5,500 feet to 6,500 feet, whilst the beautiful orange Elis was less abundant and flew at a higher level. C. nastes was very common, on all the highest grass, and varied a good deal. The specimens I took on Mt. Assiniboine were generally paler than those from the more northern mountains. Melitea anicia var Beani and a small mountain form of probably M. rubicunda, occurred on all the higher slopes of Lake

Louise and Hector district. Chionobas Chryxus was also plentiful everywhere. Ch. jutta only at Lake Louise and in Lake O'Hara valley, half way down.

On the 29th of August I left camp and started homewards. I had one day at Banff, where I got V. antiopa, just out of chrysalis, and Colias christina—very common, but considerably the worse for wear. Then I had one day at Ottawa, and half a day at Montreal, which concluded a most agreeable expedition. But the only district that I thoroughly worked, and where I got most of the insects that were to be had, is the central chain of the Rockies, on both sides of the Kicking Horse Pass.

I cannot conclude without expressing my acknowledgments to Dr. Fletcher of Ottawa, Mr. Wolley Dod of Calgary, Mr. Wheeler (C.P.R. Survey), and Mr. Cockle of Kaslo, for the great kindness and attention they showed me. And I must also make mention of James Simpson, my guide and packer, who ran my camp, took care of me, and helped me to catch butterflies. I never saw a better man with the net nor one with a quicker eye for any variation in an insect, and I can honestly recommend him to any entomologist wishing to collect in the Rockies.

Catalogue of Butterflies Taken in Canada During 1904.

1. *Parnassius clodius.* Common on the Island of Vancouver, where I was too early for it. I took it first on the Pacific coast early in June at sea level, or but little above, and at Greenwood, about 200 miles inland, at the end of June.

2. *P. smintheus.* This is the common representative of the genus throughout the Rocky Mountains. It was common at low elevations all through June, at Nelson and Greenwood, and at Kaslo in July. I took two or three specimens of the fine dark female variety *Hermodur.* In August, in a mountain gorge near Mt. Assiniboine, at a height of 7,000 feet, at least, well above tree level, I found var. *Behri* just appearing (August 13th). No females were then out, and I never met with the insect at Lake O'Hara, or in the Yoho valley later in the month.

3. *Papilio eurymedon.* Common on the Pacific coast and eastwards as far as Kaslo. In Vancouver Island it is very abundant.

4. *P. rutulus.* Common all through the west of British Columbia. Mr. Wolley Dod does not appear to have taken it at Calgary.

5. *P. glaucus* var. *turnus.* Not so common as *Rutulus*, but more widely distributed. It was very common at Greenwood, near the boundary, in June.

6. *P. zolicaon.* One specimen only, close to the Pacific coast at the boundary. It very nearly resembles *Machaon*, but Dr. Dyar gives *Machaon* as a different species, represented in America by var. *Aliaska*, taken in Alaska only.

7. *Pontia occidentalis.* Very common all through British Columbia on the western slope of the Divide right down to the coast.

8. Var. *calyce* is the high mountain form of *occidentalis*, and is much paler on the under side, and the veins yellower.

9. *P. rapæ* is an emigrant from Europe, and not a welcome one. This was the first butterfly I caught on landing at Quebec in May. It is common all through Canada to the Pacific.

10. *P. napi.* Another European emigrant, universally common but nowhere destructive.

11. *Synchloe creusa.* Of this insect I only took a solitary specimen at Banff, June 2nd. It was probably nearly over, and I saw no more of it. It is taken on the Pacific coast and crosses the Divide at Banff. Mr. Wolley Dod inclines to think that it merges into *ausonides* at Calgary. I consider my specimen from Banff to be quite distinct.

12. *S. ausonides.* Widely distributed but nowhere common. I took one or two specimens at Penticton, Greenwood, Kaslo, and Nelson, but never found it plentiful anywhere. It is common at Calgary.

13. *S. sara.* Common all through the south-western districts of British Columbia. I did not get either of its varieties. It does not occur at Calgary and probably does not cross the Divide.

14. *Eurymus* (*Colias*) *Meadii* var. *Elis.* Scattered rather sparingly over all the high mountains of the main chain of the Rockies at an elevation of 6,500 to 7,500 feet. I took the greatest number on the steep slopes of a mountain above Hector Lake. It also occurred at Lake Louise, Mt. Assiniboine and mountains above Simpson River.

15. *E. eurytheme var Keewaydin.* Of this butterfly I only took two specimens at Victoria, June 6th.

16. Var. *eriphyle* is the commonest *Colias* all through Western Canada. I took it everywhere, and without any great variation. The beautiful orange type of the species and var *Ariadne* I did not meet with. I also took two in the Fraser Canyon in May, and a fine fresh one at Banff August 30th.

17. *C. philodice* is also very common and widely distributed. I never took it at a high level, but it is the commonest butterfly at Montreal and Ottawa in September. At Ottawa (September) a fine white female variety was common.

18. *E. christina.* At Banff only, where it was flying in plenty August 30th, but in very bad order, and the females far worse than the males. It is common at Calgary.

19. *E. alexandra.* One specimen only, from Greenwood, near the boundary.

20. ——. Very plentiful in the valley from Greenwood to Midway. It also occurs through the whole of British Columbia south of Lake Okanagan. The color of the under side is much yellower than in the type (*Alexandra*), in which the under side is greenish and very pale. Dr. Rebel pronounces the specimens I sent him to be *Behri* (Edwards), but in this opinion Mr. Elwes does not agree (nor do I).

21. *E. interior.* I took it only at Kaslo, where it is not very common. Mr. Wolley Dod takes it in some numbers at Calgary, where it flies among the spruce in July, which is just where and when I took it at Kaslo.

22. *E. pelidne* var. *Minismi* (Elwes). This a very common butterfly over the whole of the higher Rockies, flying from 5,000 to about 6,000 feet. The females vary considerably, the white ones being commoner than the yellow. It flies all through August. (Dr. Rebel pronounces this insect to be not *Pelidne*, but *Skinneri* (Barnes), which he considers to be a good species.)

23. *E. nastes.* Common at very high levels on every mountain I went up in the whole chain of the Rockies. It varies considerably and I think that those from Mt. Assiniboine, the most southern point at which I found them, are paler and yellower than more northern specimens.

24. *Euptoieta Claudia.* One specimen only taken at Mt. Assiniboine in August, close to the lake, at 5,000 feet or more. It is a southern butterfly,

but a wanderer. Mr. Wolley Dod has taken two at Calgary, and there is one in the Banff museum.

25. *Argynis cybele.* Common all through the Atlantic States. Mine were taken at Ottawa, in September. Mr. Wolley Dod gets it at Calgary, but not commonly.

26. *A. atlantis.* Very common and widely distributed all through British Columbia. I took it at Kaslo, Greenwood and in the high Rockies below tree level. *Atlantis* is very like *Electa,* which Mr. Wolley Dod takes, though not commonly. I have no specimens of *Atlantis* from Calgary.

27. *A. monticola.* Widely distributed and common. I took it at every place I visited from the third week in June till the end of August. The high mountain specimens differ little from those at lower levels. It is a variable species as to color and the silvering of the spots of the under side, but the markings are the same in all that I have taken.

28. Var. *purpurascens,* which I took only near Greenwood and Nelson at low levels. It is given by Holland as a variety of *Zerene.* Dyar gives it as a variety of *Monticola,* with which its markings exactly coincide. I do not possess *Zerene.*

29. *A. coronis.* I never took this species at all on the western side of the Divide, but I believe that I got a battered individual at Banff, August 30th. Those I have were all taken by Mr. Wolley Dod near Calgary, where it is not uncommon. Very like *Halcyone.*

30. *A. nevadensis.* Widely distributed through the Rocky Mountains, but I never saw it common except at Banff, where there were many, much worn, August 30th. It ranges as high as tree level, but I never took it west of the Divide. Common at Calgary.

31. *A. nevadensis* var. *Meadii.* One, June 18th, in the Upper Keremeos, and one, much battered, at Mt. Assiniboine, August.

32. *A. eurynome.* Widely distributed, nowhere common. I took a fine dark form in the Selkirks at about 8,000 feet. I also took a paler form at Kaslo.

33. *A. eurynome* var. *Clio.* Also widely distributed and not common. My high mountain specimens are all much paler than the Kaslo insects.

34. *Brenthis myrina* is the *amphirape* of the Eastern Hemisphere. I found it in swarms at Mt. Assiniboine in August, flying over the marshy ground near the lake, which was formerly the basin of a great glacier. I also took it by Lake Louise in July. Mr. Wolley Dod takes it commonly at Calgary.

35. *Brenthis chariclea.* Very common everywhere in the Rockies among brushwood. Common at Calgary.

36. *Brenthis chariclea* var. *Boisduvalii,* is apparently undistinguishable from *Chariclea,* though Holland gives it as a separate species.

37. *B. chariclea* var. *obscurata.* I have so called a remarkably dark female taken near Lake Assiniboine, very high up.

38. *Brenthis freija.* Common in May at Calgary and Banff. Also took it in mountain bogs near Lake Okanagan in June at 5,000 feet or more.

39. *B. frigga.* Common in bogs at Banff and Calgary, also took it near Lake Okanagan in mountain bogs.

40. *B. bellona.* Common at Calgary, Ottawa, and generally west of the Divide.

41. *B. epithore.* The Pacific form of *Bellona.* Common and generally distributed. Flies at high elevations.

42. *Brenthis alberta.* Nowhere in great numbers, but widely distributed over the higher peaks of the Rockies end of July and August. All the peaks round Lake Louise and Lake O'Hara, Hector, Mt. Assiniboine, and head of Yoho valley, produced a few specimens (not always captured). I never saw it below 7,500 feet.

43. *Brenthis astarte* is another very common butterfly, if you seek it on the highest points not entirely snow-covered. It is very hard to catch, but very unmistakable to the eye. It has an even wider range than *Alberta,* for I saw it, without securing one, at Glacier Crest in the Selkirks. The males haunt the summits, the females are to be found on the highest grassy slopes, and are not very hard to stalk, when feasting on a flower.

44. *Lemonias (Melitæa) chalcedon.* I took this fine insect only at Greenwood and in the district south-west of Lake Okanagan.

45. *L. anicia.* The commonest of the family. I took it at nearly every place I visited. Penticton, Kaslo, Lake Louise and the Selkirks all produced it in plenty; but Mr. Wolley Dod finds it rare at Calgary.

46. *L. anicia* var. *Beani.* A small and dusky high mountain form of *Anicia,* not uncommon on the highest grass slopes about Lake Louise, Hector and Lake O'Hara. I never saw it under 7,000 feet.

47. *Lemonias nubigena.* Two specimens only, from Revelstoke, a very hot place, 1,400 feet.

48. *L. rubicunda.* Another Californian insect, which extends into the Rockies as far north as Hector and Lake Louise. I never took it commonly. It may be so around Lake Okanagan in July.

49. *L. palla.* Common about Lake Okanagan, Greenwood and Kaslo in June. I never took it in the Rockies, but Mr. Wolley Dod gave me a specimen from Red Deer, 100 miles north of Calgary. There the winter is remarkably mild.

50. *Phyciodes tharos.* Very common at Nelson, Kaslo and Calgary. Did not find it in the mountains.

51. *Phyciodes pratensis.* Universally common. A small mountain form occurs at Hector, at 5,000 feet.

52. *Phyciodes pratensis* var. *Orseis.* Ranked as a species by Holland. Probably the south-western form of type. I took mine on the Pacific coast.

53. *Phyciodes camillus.* Common at Greenwood and Penticton in June, and I took one at Hector, at 5,500 feet, in July.

54. *Psyciodes mylitta.* In the Okanagan country in June. I took none in the mountains or further eastwards.

55. *Polygonia satyrus.* At Victoria in June, and at Calgary in May, all hibernated specimens.

56. *Polygonia faunus.* At Victoria only in June. Mr. Wolley Dod reports it from Calgary and Banff, but not commonly.

57. *P. zephyrus.* At Field, common in August, and at Banff.

58. *P. gracilis.* At Ottawa and Montreal only. It does not appear to occur in British Columbia.

59. *Polygonia oreas* var. *silenus.* Two specimens at Banff, August 30.

60. *P. progne.* One at Calgary, 31st May, one at Ottawa in May, and several at Ottawa in September.

61. *Eugonia californica.* Two fine fresh specimens at Bonnington Falls, near Nelson, end of June.

62. *Euvanessa antiopa.* Just appearing at Banff in August. It is common all through Canada and I took worn specimens in June in the Upper Keremeos.

63. *Aglais milberti.* Very common all along the Pacific side of the Selkirks, and I took it high up, 8,000 feet, above Glacier. I never saw it in the Rockies, but it is common at Calgary.

64. *Vanessa atalanta.* One specimen only, in July, above Kaslo. I saw one other at the same place; no others. It is very rare at Calgary.

65. *Basilarchia archippus.* One specimen only at Penticton, near the river. I saw one other at the same place. It is an occasional visitor at Calgary.

66. *B. Lorquinii.* Very common all through the western slopes of the Divide and flies at Glacier. Not seen by me in the Rockies and not found at Calgary.

67. *Cercyonis charon.* Common at Penticton, Nelson, and Banff, at low levels throughout the summer.

68. *Erebia discoidalis.* Very common at Calgary and Banff in May at moderate elevations. I never saw it west of the Divide.

69. *Erebia Vidleri.* Plentiful in the open woodlands of the upper Keremeos, in mid-June at an elevation of from 3,000 to 4,000 feet. Only males had then appeared. I did not take it on similar ground at Nelson and Greenwood a week later.

70. *Erebia epipsodea.* The commonest *Erebia* from Penticton to Calgary and flies as low as 2,500 feet.

71. *Cœnonympha ampelos,* or *ochracea,* or *inornata.* Very common everywhere at moderate elevations from Victoria to Calgary. Mr. Wolley Dod cannot separate the species.

72. *Cœnonympha elko.* One specimen only, near Lake O'Hara, in August. Evidently a wanderer.

73. *Œneis Macounii.* Taken by Mr. Wolley Dod near Calgary. He took this rare butterfly in some numbers in June last, on the summits of grassy hills, about 4,000 feet.

74. *Œneis chryxus.* Very common everywhere from the warm slopes of Okanagan and Nelson right up to the high glens of the Rockies, even above tree level. It varies little. Mr. Wolley Dod has never taken it at Calgary, but it flies at Banff.

75. *Œneis varuna.* At Calgary only, where it is common in May and June. I never saw it at Banff, or in the Rockies.

76. *Œneis jutta.* Not uncommon in mountain marshes. I took mine at Lake Louise in July. It is common at Calgary.

77. *Œneis norna* var. *Beanii.* This active butterfly is common on all the high rocky summits of the Rockies. It haunts lichen-covered rocks, which it exactly resembles in color. I never found the female lower down, as was the case with the *Astarte* female.

78. *Uranotes melinus.* At Kaslo and at Bonnington Falls in June.

79. *Thecla sæpium.* At Bonnington Falls, just out, third week of June. I was too late for it at Kaslo.

79½. *Thecla augustus.* Banff, May.

80. *Thecla spinetorum.* One much worn female, upper Keremeos, June 18th.

81. *Thecla acadica.* One at Kaslo, where it is common. I was too late for it.

82. *Callicista eryphon.* Banff, in May, high up among pines.

83. *Callophrys dumetorum.* Several wretched specimens at about 5,000 feet in June, above upper Keremeos. Probably common earlier.

84. *Chrysophanus thoe.* At Ottawa along the railway banks in September, rather common, but worn. It also occurs at Calgary.

85. *Epidemia mariposa.* Very common everywhere in the Rockies, and flies up to 6,000 feet.

86. *Epidemia zeroe.* Not uncommon in the south Okanagan country, and at Greenwood. I never found it in high mountains.

87. *Epidemia helloides.* Very common everywhere in the west at low elevations.

88. *Heodes hypophleas.* Not common. I took several at Ottawa. Mr. Wolley Dod takes it sometimes near Calgary.

89. *Chalceria Snowi.* The most beautiful of the coppers. A high mountaineer, never seen below 7,000 feet. Widely distributed over the high Rockies, but seldom plentiful.

90. *Cupido heteronea.* At Greenwood and in the lower Keremeos in June. I met with it nowhere else.

91. *Cupido fulla.* I have this butterfly from Calgary only, where Mr. Wolley Dod takes it commonly. Mr. Elwes considers it to be identical with *pheres*, which it closely resembles.

92. *Cupido sæpiolus.* Very common everywhere and flies up to 6,000 feet at Hector. Very common at Calgary. Dr. Rebel calls it *L. antiacis.*

93. *Cupido pheres.* Common in the south-west of British Columbia, Penticton, Greenwood and Vancouver. Not taken at Calgary. It is very near to *C. fulla.* Dr. Rebel calls my specimens *L. lycea* (Edw.).

94. *Nomiades Couperi.* Very common on both sides of the Divide, but not high up. Very like *Antiacis.*

95. *Phœdrotes sagittigera.* Not common. I only took three at Greenwood and upper Keremeos. It is taken occasionally at Calgary and Kaslo.

96. *Agriades aquilo.* A high mountaineer, locally abundant at Lake Louise, Hector and Lake O'Hara.

97. *Agriades rustica.* Very common at Calgary. I never took it at all.

98. *Agriades podarce.* One specimen only, taken July 5th, on Bear Mountain, behind Kaslo, which is a locality for *Podarce.* I was too early to get a series and have no female, which is said to be distinct. The male is exactly like *Aquilo.*

99. *Rusticus melissa.* Very common everywhere up to 6,000 feet. (*Argus.*)

100. *Rusticus acmon.* Common near Greenwood. A southern insect.

101. *Rusticus anna.* Two from Bear Lake, which is a locality for it, and one female from Penticton. A southern insect.

102. *Everes amyntula.* Common everywhere in the West, also at Calgary.

103. *Everes comyntas.* Not common. My specimens are from Penticton. It is taken at Kaslo and at Victoria.

104. *Cyaniris pseudargiolus*. Very common and variable.

105. *Amblyscirtes vialis*. Only taken by me at Greenwood, June. Reported from Vancouver and Kaslo.

106. *Pamphila palæmon*. Very common and flies as high as Glacier.

107. *Erynnis comma*. Very common and widely distributed.

108. *Polites peckius*. Only one at Nelson, June. Reported from Calgary.

109. *Anthomaster leonardus*. Only at Ottawa, in September.

110. *Thymelicus cernes*. Common at Penticton, June. Reported from Coldstream (Pacific coast) and Calgary.

111. *Thorybes pylades*. At Penticton, much worn, in June. Reported from Kaslo and Calgary.

112. *Pholisora catullus*. Common at Penticton.

113. *Thanaos juvenalis*. At Ottawa only. An eastern insect.

114. *Thanaos persius*. Very common at Greenwood, Penticton, Vancouver and Calgary.

115. *Thanaos icelus*. Common and widely distributed.

116. *Hesperia centaureæ*. One only, very high up, above Lake Louise. None reported from other places.

117. *Hesperia cæspitalis*. Common in upper Keremeos, but nearly over. Common near Victoria (May). Not common at Kaslo and Calgary.

Notes on the above Paper by Dr. James Fletcher.

The above extremely interesting paper by Mrs. Nicholl was kindly given to us for publication last summer. Unfortunately, Mrs Nicholl's absence exploring in the Rocky Mountains during the summer, my own subsequent absence from Ottawa, and the early call for the manuscript for the Report, made correspondence with Mrs. Nicholl, about some of the above named species, impossible. As it is important that the paper should be published without delay, I add a few notes concerning some of the species, with regard to which there was some doubt, thinking that as I have collected in most of the localities mentioned, these might be of use to lepidopterists.

6. *Papilio zolicaon* is a black swallow-tail with yellow markings, *machaon* on the other hand is yellow with black markings. *Oregonia*, which flies in the interior of British Columbia, is much more like the European *machaon* but is larger. It is easily separated from *zolicaon* by its larger size, broader areas of yellow, particularly on the lower side, and by the characters of the large red ocellus at anal angle, which is much more like that of *machaon* than of *zolicaon*, not being pupilled, as a rule, but with the margin running round into the lower part of the ocellus and ending in a club-shaped expansion, with or without a short spur at the extreme anal angle. The characters are best seen on the lower side.

11. *Synchloe creusa* is smaller than *S. ausonides*, is greener beneath, with the spots smaller and silvery pearly. The black discal spot on the primaries beneath is cut off square at the bottom, where it runs along the vein. In *ausonides* this spot tapers.

20. This was probably *Colias emilia* which flies in the Okanagan valley just at the time Mrs. Nicholl was there. The male is like a large *interior* but sometimes has an orange flush. The female is very much like some females of *christina*. Both sexes have beautiful red fringes. *Alexandra* has a white fringe and a silvery white spot beneath on the lower wings. In *emilia* the spot is white but is more or less conspicuously ringed with pink. *Edwardsii*, as I understand that species, is like *alexandra*, but has pink in the fringe, and some of the females are marked as in *christina* female. *Behrii* in no way resembles the species above referred to. It is a small, very dark green thing. There must have been some mistake about the specimens examined by Dr. Rebel.

22. *Eurymus pelidne*, var. *minismi*, Elwes. I cannot find that this name was ever published, although Mr. Bean always spoke of the insect Mrs. Nicholl refers to, under the name of *minismi*. *E. pelidne*, var. *Skinneri* is the same thing.

24. *E. claudia* is a prairie species. The larvæ are sometimes destructive to pansies and other violets in gardens.

26. *Argynnis atlantis*. The Rocky mountain species called *atlantis* by Mr. Elwes is claimed by Mr. Edwards to be *electa*. There is only one form in our Rocky Mountains.

Melitœa chalcedon has not so far been recorded from a Canadian locality. Possibly this may be *Macglashani*, which occurs in the Boundary country.

M. nubigena. True *nubigena* has not been recorded from Canada.

48. *M. rubicunda*, ditto.

54. *Ph. mylitta* is a small species expanding about 1 inch to 1¼ inches. All that I have seen from the Okanagan are a somewhat similar species, *Ph. Barnesii*, with a large female expanding about 1½ inches.

71. *Cœn. ampelos*. This species at least is easily recognised by the absence of ocelli and by its silky pale fawn color. It is the only *Cœnonympha* on Vancouver Island. *Inornata* is much darker in tone than *ochracea* and has much less white beneath.

72. *C. elko* is a synonym of *ampelos*.

88. *Heodes hypophleas*. The species taken by Mr. Wolley-Dod near Millarville, south of Calgary, is a magnificent insect larger and far finer than any form of *hypophleas* we have in Canada. I hope Mr. Dod will describe it.

92. *Cupido sœpiolus*. This species in no way resembles *antiacis*. The male is silvery blue above, has a double row of spots on hind wing beneath and two or three reddish spots at anal angle above. None of these characters are found in *antiacis*.

93. *Cupido pheres*. The form of this species on Vancouver Island is the variety *ardea* which has the spots beneath almost obliterated. *Lycea* is like *fulla* but is violet blue above, not the silvery blue of *pheres*.

94. *Nomiades Couperi*. The mountains form here referred to is called *lygdamus* by Canadian collectors following Mr. W. H. Edwards.

100. *Rusticus acmon*. Common across the plains.

101. *Rusticus anna*. Not uncommon on Vancouver Island and at many places in the mountains.

103. *Everes comyntas*. I never saw this from Vancouver Island. *Amyntula* is common everywhere from Manitoba to the Coast. The differences are slight, but the two species can, as a rule, be easily separated. *Comyntas* is less silvery beneath and altogether a more eastern-looking species.

INSECTS INJURIOUS TO ONTARIO CROPS IN 1905.

By James Fletcher, Dominion Entomologist, Ottawa.

In nearly all parts of Canada, weather reports have shown favourable conditions for the growth and maturity of crops, and Ontario has been no exception in this respect. Although reports have mentioned a large number of different kinds of insects which have been more or less noticeable by their attacks upon crop-plants, there have been fewer bad outbreaks of injurious insects than has been the case for many years; and the general report of the year in Ontario is that there have been no attacks of special importance and no new enemies which are likely to be the cause of serious loss in the future. Notwithstanding this, however, there are still plenty of the old and well known enemies which require the attention of the fruit grower and farmer; and this seems an appropriate time to again reiterate the warning that the most effective time to fight injurious insects which are known to have extensive powers of injury, is just when they occur in small numbers, as evidenced by slight injury. It becomes more and more apparent every year that preventive measures for warding off insect attack should become general principles of agriculture to be applied as a matter of course every year.

Now that spraying fruit trees to protect them against injury by the Codling Moth and the Black Spot fungous disease, has become such a matter of course with the leading fruit growers, there are numberless instances which might be cited in proof of the statement that orchards which are sprayed every year gradually become so free of their enemies that practically they may be said *always* to produce clean fruit, whereas in neighbouring orchards where no spraying is done, the opposite to this is the case.

Cereal Crops.

The worst enemies of grain crops have been conspicuously absent during the season of 1905. There have been no complaints at all of Hessian Fly; and, although, if looked for carefully, it was possible to find in one or two localities the orange larvæ of the Wheat Midge, there have been no reports received from farmers of their occurrence. Neither Wireworms nor White Grubs were mentioned in grain crops. The only exception to the general immunity was in the case of a locally rather severe occurrence of the Wheat Joint Worm (*Isosoma tritici*, Fitch). This was at Millbrook, Ont., where it did considerabe harm. Mr. T. D. Jarvis, of Guelph, also mentions Joint Worms as the cause of injury to both wheat and barley in western Ontario.

In Ontario there is only one annual brood of the Joint Worms, the insects passing the winter as larvæ within cells which they have hollowed out inside galls made at joints of the swollen and distorted straws, Fig. 29, These are, for the most part, so near the ground that a large proportion of the larvæ are left in the fields in the stubble. The ploughing down deeply or the burning over of stubble in autumn reduces the numbers of the larvæ which can turn to flies the following spring. That part of the stem which is attacked, generally swells and makes a distorted and bent gall; but this is not always the case, the attacked portion of the stem simply becoming thickened and hardened. These hardened portions frequently break off in threshing and are either carried through with the grain or with the small seeds. When cleaned out, they should be destroyed and not left on the ground, where the flies can hatch the following spring and fly to the fields. When the screenings are fed, these should always be crushed; but, if fed

to chickens, it should be done where the galls will be trampled under the feet of stock or otherwise destroyed. The straw from an infested crop should be either fed or burnt before the ensuing spring. A regular and short rotation of crops and the mowing down of all grasses along the borders of fields, have been found useful in controlling these enemies of the wheat grower.

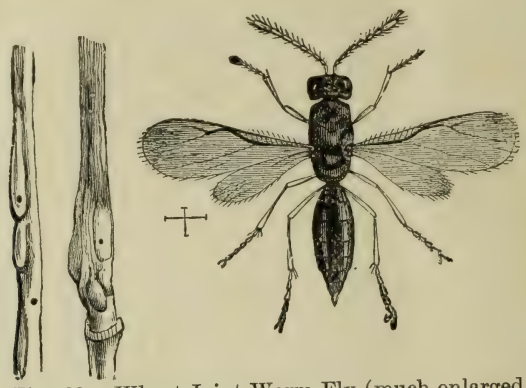


Fig. 29. Wheat-Joint Worm Fly (much enlarged), and stems showing galls.

Peas in Ontario have been an excellent crop, without any injury by insect enemies. The Pea Moth seemed almost entirely to restrict its attacks to the seeds of wild legumes such as the Purple-tufted Vetch, the Wild Tare and the Cream-coloured Vetchling. The Pea Weevil has only been reported with regard to its disappearance; and we again point out the importance of everybody insisting on having all seed pease fumigated before

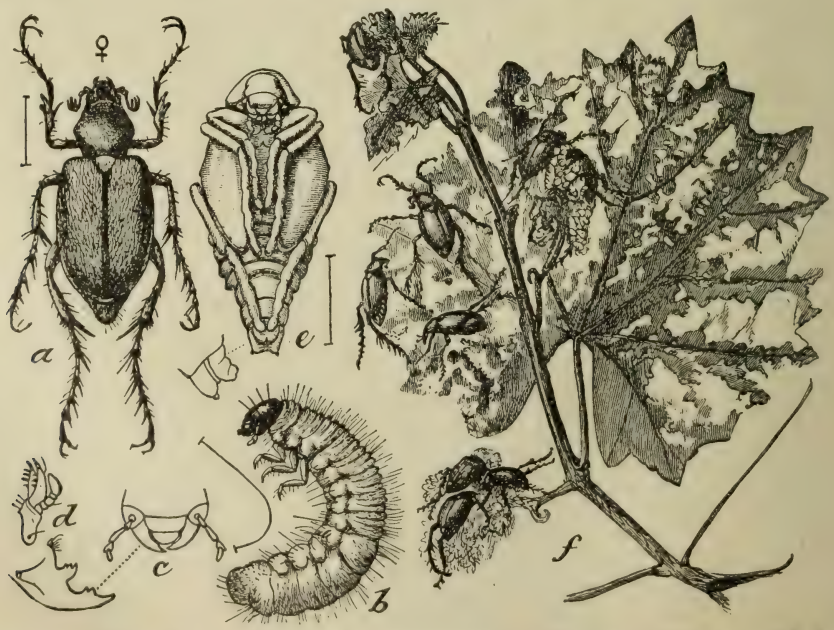


Fig. 30. Rose Chafer (*Macrodactylus subspinosus.*) *a*, beetle; *b*, larva; *c* and *d*, mouth-parts of same; *e*, pupa; *f*, injury to leaves and blossoms with beetles, natural size, at work. After Marlatt, U.S. Dept. Agriculture.)

sowing them. The reputation of our Canadian grown pease has risen again rapidly since last year, on account of their freedom from weevils; but growers may remain perfectly certain that, if they again become negligent and do not treat their seed pease, they will have to suffer for it, by the Pea Weevil increasing in numbers and in destructiveness.

Fodder Crops.

The loss in grass and fodder crops in 1905 from insect enemies was nowhere noticeable; but there were one or two interesting occurrences from the entomological point of view. The most remarkable of these was a severe, although short, attack on young corn grown in Grey county, by the Rose Chafer. *Macrodactylus subspinosus*, Fab., Fig. 30. Late in June the beetles flew in large numbers to a field of growing corn when the plants were about eight inches high and in a good vigorous condition. They appeared suddenly, covering about two thirds of a twenty acre field; and clustered, as many sometimes as twenty insects on each plant, and devoured the leaves. This swarm remained on the corn field for only three days, during which they did considerable harm, and then disappeared as suddenly as they came.

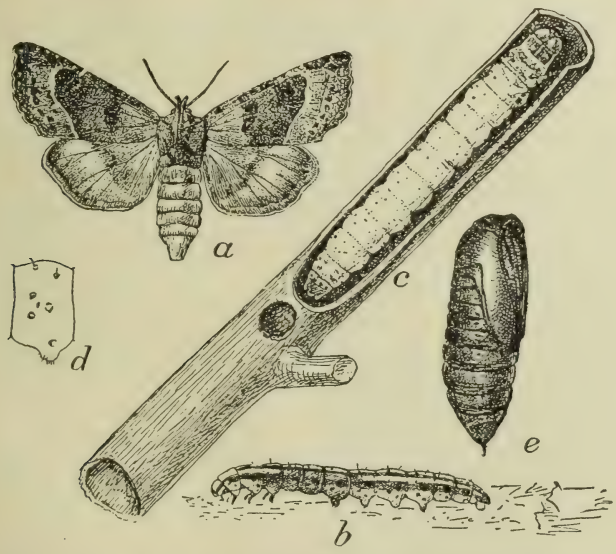


Fig. 31. Stalk-borer (*Papaipema nitela*); *a*, female moth; *b*, half-grown larva; *c*, mature larva in injured stalk; *d*, lateral view of abdominal segment of same; *e*, pupa—all somewhat enlarged. (After Chittenden, U.S. Dept. Agriculture) Full measure.

The Stalk Borer (*Papaipema nitela*, Gn.), Fig. 31, which in past years has frequently been accused of doing injury to various plants, but of which no reared specimens were to be found in collections in Canada, was this season certainly identified from specimens sent from Fargo, Ont., by Mr. G. W. Riseborough. In previous years all larvæ sent in under the name of "*Gortyna nitela*" proved to be when reared, *Papaipema cataphracta*, Grt., which is a much wider-spread species in Canada and of which the larva is very similar to that of *P. nitela*. This is a rather general feeder, like *P. cataphracta*, but has more frequently been known as the Potato Stalk Borer, although it attacks corn probably to a greater extent even than potatoes. Mr. Riseborough found the larvæ in some numbers in his corn field

and also sent specimens which had attacked potatoes and Canada Thistles. Moths were reared from these, and also some parasites. Later in the season the corn crop outgrew the injury, as there were sufficient plants left, and a good crop was reaped.

"Silver Top" in timothy and other grasses was not so much noticed as usual, although it caused some anxiety in Middlesex county early in July. The cause of this whitening of the head is the work of a very small insect belonging to the Thripidæ, probably *Phlœothrips poaphagus*, Comstock, which attacks the soft growing base of the top joint, inside the uppermost sheath. The same, or a similar injury, occurs in oats in which not the whole panicle but the lowest flowers while in the sheath are attacked and blighted, so that they turn white and never develop. The injury of the Grass Thrips is of an intermittent nature, but is always much worse in meadows which have been down to grass for many years, and particularly when the land is exhausted or of low fertility. There is no remedy which can be applied to grass lands; but a short rotation by which the land is ploughed up at short intervals and used for other crops, has been of great advantage. The presence of the Grass Thrips was noticeable in almost all localities through the province, wherever looked for, and the only reason it was not more complained of, was the abundant growth of all grass from the frequent and well timed rains.

The Clover Seed Midge (*Cecidomyia leguminicola*, Lintner), although perhaps not quite so destructive as in 1904, was still terribly abundant and its presence could be detected by the appearance of the clover fields at the end of June and early in July in all parts of the province. It was more abundant at Ottawa than it has ever been before. No better remedy has been discovered than that one which has given such good results wherever tried, of feeding off seed clover fields up to the 20th June and then leaving the second crop for seed.

The Clover-leaf Weevil (*Phytonomus punctatus*, Fab.) occurred this year for the first time at Ottawa. No injury was noticed on the clover crop, a few specimens only of the mature beetle being taken. Although loss from this insect is seldom extensive, owing to the prevalence of the parasitic fungus, *Entomophthora sphærosperma*, Fres., which destroys the larvæ in enormous numbers. It will be well for clover growers in the district to be on guard against an outbreak next June.

The Green Clover Weevil (*Phytonomus nigrirostris*, Fab.), as is usually the case, was far more abundant and destructive than its larger and more formidable looking relative. The newly emerged perfect beetles appear in July and in autumn, and pass the winter as beetles, hidden away beneath leaves, moss, etc. The slender slug-like grubs feed upon the leaves, particularly those surrounding the forming flower heads of which they eat the stipules; they also burrow into the heads, where they destroy many of the flowers during June. When full grown, they spin pretty white lace-like cocoons inside the bracts of the clover heads. The summer brood appears early in July. When clover fields show the presence of this or the Clover leaf Weevil in large numbers, they should at once be fed off or cut. If the beetles are noticed very early in the season, it may be found desirable to plough down the clover in May and use the field for corn or for some other crop.

The Clover-seed Caterpillar (*Grapholitha interstinctana*, Clem.) was noticed in many places, the pretty little silvery moths being seen on the foliage and flying about the flowers. The injury from this insect is, as a rule, small in extent, and the same remedies will answer for it and the clover weevils.

The Red-headed Flea-beetle (*Systena frontalis*, Fab.), Fig. 32. This beetle which has a very wide range of food plants was found as a destructive pest on the second crop of clover in August, both at Ottawa and Guelph, Ont. The insect, which is a common species, was rather more abundant than usual, and it occurred doubtless at other places where it was not noticed.

Root Crops and Vegetables.

The favourable season enabled all garden and field crops of this class to develop well. Cutworms of a few kinds, as usual, did considerable harm locally; but there was no extensive outbreak such as sometimes occurs.

During the month of July almost all plants in the flower and vegetable garden were attacked at Ottawa by a smooth cutworm-like caterpillar, when young greenish in colour, but having the body divided into two equal parts above and below the spiracles, the back being dark with three pale lines along it, and the underside of the body yellowish up to a clear yellowish side stripe. These at first rather inconspicuously marked caterpillars, were largely nocturnal in habit, coming out at night and devouring nearly all kinds of vegetation. They were particularly destructive to the forming seed pods of larkspurs. After the last moult they were very much more conspicuously marked, presenting a handsome Mamestra-like appearance with three lines down the back and with each segment ornamented with large black velvety patches on the back and above the spiracles. The head honey-coloured and mottled. When full grown, these caterpillars are very vor-

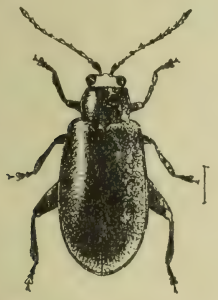


Fig. 32. Red-headed Flea-beetle (greatly enlarged) (Chittenden, U.S. Dept. Agricl.)

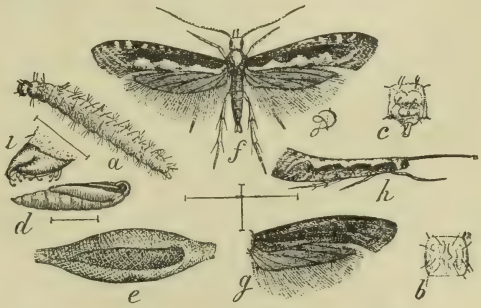


Fig. 33. The Diamond-back Moth; *a*, caterpillar; *d*, pupa; *e*, cocoon; *f*, moth—enlarged. (U.S. Dept. Agriculture.)

acious. They are about two inches in length, cylindrical in shape, like cutworms, and about a quarter of an inch in diameter. There is very much variation in their colours, some specimens being almost black, while others are of a dark olive green; but all specimens show a distinct side band and the three thread-like stripes down the back. These caterpillars were the progeny of a rare species of noctuid moth named *Barathra occidentata*, Grt., an insect which is so rare that the only specimens I had ever seen before were two reared by Mr. J. A. Guignard many years ago from larvæ which he had found destroying larkspurs in his garden; and Dr. J. B. Smith reports that it is an extremely rare insect in collections. In June, while collecting moths at Ottawa, we had found that this species was well represented among our captures, and we were pleased to secure eggs and rear the larvæ. Later, however, the caterpillars occurred in too great abundance out of doors. There is only one brood of *Barathra* in the year, the eggs being laid in June and the caterpillars feeding through July and into

August. Not only was the species found in abundance at Ottawa, but specimens were sent from Nova Scotia and were also found at Nepigon, Ont., as destructive enemies of the cabbage; it also occurred at various places between these two points, and Dr. Fyles took it at Quebec. Favourite foods in the vegetable garden were cabbage and spinach.

The Diamond-back Moth (*Plutella maculipennis*, Curtis, better known as *Plutella cruciferarum*, Zell.), Fig. 33, was abundant and destructive in many places, doing considerable harm in rape fields and on Swede turnips and cabbages. The attack, however, was of rather short duration and ended sooner in the season than is usually the case. This little insect is very much attacked by a small hymenopterous parasite which this year occurred in large numbers. The remedies for controlling the small caterpillars are rather difficult of application. They consist of kerosene emulsion, or arsenical mixtures mixed with soap washes, which must be sprayed well under the leaves by means of an angled nozzle. An important supplementary treatment is to induce a vigorous growth of the crop with light surface dressings of nitrate of soda. As a preventive measure, care must be taken to keep down all weeds and plants of the Mustard Family and to destroy in autumn all refuse plants of a crop which has been attacked.

The Turnip and Cabbage Aphis (*Aphis brassicæ*, L.) did much harm to turnip crops particularly around Guelph, but also in many other parts of the Province. There is nothing new in the way of a remedy; but it is well to emphasize the importance of feeding off or ploughing down turnip tops and remnants in cabbage fields, late in autumn, so that the over-wintering eggs may be prevented from hatching.

The Turnip Flea Beetle (*Phyllotreta vittata*, Fab.) was only once or twice mentioned in correspondence; but the favourable weather which prevailed in most parts of the province at the time the young plants were starting, gave them full opportunity to outgrow the attacks of the beetle.

The Onion Maggot and Cabbage Maggot, which for the last few years have been so excessively destructive, during the past season were hardly noticeable in many localities where in previous years they had made a clean sweep of almost everything.

The Carrot Rust-Fly (*Psila rosæ*, Fab.), on the other hand, was rather more abundant than usual and extended over a wider area than for many years past. Some early carrots at Ottawa were quite destroyed; but later sowings on the same ground produced satisfactory crops. There was no injury recorded to celery or parsnips, both of which are occasional food plants of the Carrot Rust-fly. The remedies for this insect are to take great care, when thinning out young carrots, to do this late in the day, and then spray the rows at once with a deterrent preparation, such as kerosene emulsion or a carbolic wash. The time when most injury is done, is in June and July, so that two or three sprayings, a week apart, will generally have the effect of protecting the crop. The late sowing of seed has been frequently attended with good results, and carrots should never be planted in the same spot as they were grown the previous year. Should maggots be found in stored carrots, the sand in which these roots are kept for the winter, should be treated in spring so that the puparia therein contained may not give forth their flies. This may be done either by burying it in a deep hole or by throwing it into a pond or into a barnyard where it will be trampled by stock.

Fruit Crops.

The fruit crops of the province may be said, on the whole, to have been very good in quality, although in some localities the yield was rather light.

Apples in the Ottawa valley were abundant and in sprayed orchards of first quality. In western Ontario the crop was rather poor, the shortage being due probably to lack of vigour in the trees. The very severe winter of 1903-04 worked great havoc in orchards. The trees in 1904 bore very heavily, which fact was in many cases an indication of weakness. This made a further draught on their strength, and the result was apparent in 1905. The very fact that the crop was light this season, was a benefit to the trees. Another cause for the lowering of the average of the apple crop in 1905 was the heavy wind storm which occurred in October last. Plums were a good crop and much less injured by the Curculio than last year. Peaches and pears were abundant and of high quality. Grapes were to some extent attacked by the Grape Rot; but, on the whole, vineyards which were sprayed and well looked after gave good returns. The Grape-berry moth (*Eudemis botrana*, Schiff.), Fig. 34, was prevalent in south-western Ontario, as could be seen by traces of its work in grapes which were sent to the market. This little insect, the minute caterpillars of which eat into the berries and web two or three of them together, is apparently increasing in the grape-growing districts of the province. The remedy which has been suggested by Saunders, is to gather up and burn all leaves of the vines in the autumn, so as, at the same time, to destroy the overwintering pupæ.

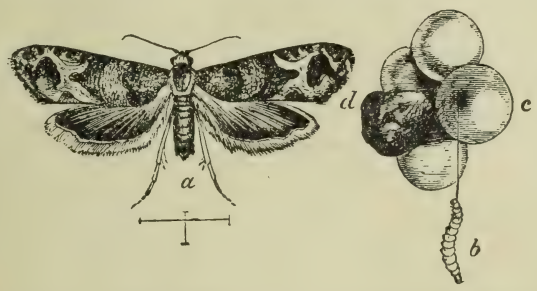


Fig. 34. Grape-berry moth; *a*, much enlarged; *b*, caterpillar; *c*, grapes; *d*, injured berry.

The San José Scale (*Aspidiotus perniciosus*, Comst.). Notwithstanding all that has been written on the subject, there is little change in the San José Scale situation. In the infested district there are still a great many fruit growers who are content to grow small, poor and almost useless crops of fruit, because they will not spray; but most of the advanced growers have now adopted the lime and sulphur wash and have grown paying crops as a consequence. That large class of fruit growers who are always on the lookout, first of all, for something new, and put off work on this score, have unnecessarily lost a large percentage of the returns which they might have had for the necessary yearly work among their fruit trees. If any new remedy is discovered which will take the place of those already in use, over-anxious people may be quite sure that it will be quickly made known and they will soon hear of it, if it proves successful. There are ample means in Canada for anyone engaged in any kind of farming to find out, free of all cost, from the Government institutions, both at Ottawa and at Guelph, what the recognized best treatment is, and they would be wise to adopt this until something better has been discovered. There is never a year passes by that some new and loudly exploited supposed improvement on recognized methods, or some new remedy, is not brought forward to be heard of for a short time and then disappear altogether. The best advice which I think can be given to those who are wise enough to acknowledge that they do not

know everything about their own work, is to watch carefully and learn from their most successful and enterprising neighbours, at the same time, keeping well posted as to the progress of the experimental work of the Government officials specially engaged to investigate these matters, and to obtain and read their reports, which are published by the Government for their benefit and all of which are distributed free to all applicants.

In this connection, it may be well to mention Prof. Close's recent improvement in the convenience of making kerosene emulsion by first mixing the kerosene with lime and then simply churning it in water, and also the later improvement on this method by Mr. F. T. Shutt, in substituting flour for lime, which gives it a much wider range of usefulness. There are many parts of Canada where lime cannot be obtained easily; but flour is a necessity everywhere, and it has been found that, for a kerosene emulsion which is to be used at once, there is nothing more convenient than to mix the kerosene and flour in the proportion of one pint of kerosene to four ounces of cheap flour, and, when this is thoroughly mixed, add one gallon of water (preferably warm) for every pint of kerosene. The whole is then vigorously churned for from two to five minutes, and the emulsion is ready for use. Even a weaker mixture will answer if the emulsion is to be used immediately; for two ounces of flour will emulsify, or more correctly hold entangled around its molecules, one quart of kerosene for a sufficient time to be applied by a spraying pump; but, on standing for a short time, the kerosene will separate from the water. Mr. Shutt has also found, however, that by scalding the flour before adding the kerosene, an excellent emulsion which will not separate for several days, can be prepared with two ounces of flour and one quart of kerosene, mixed with two gallons of water. For immediate use and particularly in gardens and over small areas, this emulsion will be of the greatest value. The above quantities for making the new emulsion give a percentage of coal oil to water equal to that contained in the ordinary Riley-Hubbard formula, which has two gallons of coal oil in every thirty gallons of wash ready for use.

These new kerosene emulsions have been very much discussed in connection with work against the San José Scale; and it is probable that, if their application were persisted in, they would finally vanquish the San José Scale; but the cost of labour and materials in these frequent applications would probably render them unpractical remedies. For this redoubtable enemy, something more drastic is necessary; and the lime and sulphur wash which has so frequently been recommended in our reports, is still the best standard remedy for that insect. The recently sent out proprietary remedies "Kil-o-Scale" and "Scalecide", notwithstanding their forbidding names, are said by Dr. J. B. Smith, of New Jersey, to have given good results. These are petroleum preparations prepared, I believe, to a large measure in accordance with Dr. Smith's advice. For the meantime, however, the lime and sulphur wash remains the standard remedy for the San José Scale, and, if regularly and carefully used, will keep trees in a healthy condition and enable them to produce paying crops of fruit.

The Woolly Aphis of the Apple (*Schizoneura lanigera*, Hausm.). See Fig. 1, page 10. An insect which has been particularly abundant and much noticed by fruit growers from the conspicuous white colonies which have been seen on apple trees and hawthorns during the past season is the Woolly Aphis of the Apple. It is many years since this insect has appeared in the vast numbers that it was noticed in 1905. The injury, however, has not as yet been very great, and, since the root inhabiting form is seldom destructive in Canada, it is to be hoped that the abundant occurrence of the past season will not be attended by serious after consequences in our or-

chards. The attacks were largely upon nursery stock, and the colonies could doubtless have been destroyed by an application of kerosene emulsion or a whale-oil soap wash. As the colonies are so dense and frequently many of them are hidden inside an open swelling caused on the bark of young trees by their punctures, spraying the above insecticides would not in all cases reach all of the insects. Where possible, a more thorough application by means of a stiff brush would probably be more satisfactory. In very bad instances, however, twigs high up in the trees may be covered with the plant-lice, and in such cases the only practical treatment would be spraying with a strong kerosene emulsion (one to six), and the liquid must be applied with as much force as possible.

The Buffalo Tree-hopper (*Ceresa bubalus*, Fab.). This little homopter is often complained of for the injury done to young apple wood by the egg-laying females, which cut crescent-shaped slits in pairs along the young branches when depositing their eggs. These slits run deeply into the wood and leave lasting scars which give an ugly gnarled appearance to the trees. Injury is seldom severe; but a remarkable instance has occurred during the past summer in Mr. J. P. Gourdanier's magnificent seventy-acre orchard at Morven, Lennox county, Ont., where nearly all the trees were severely injured. The remedy usually recommended for this insect is to spray at the time the young hoppers hatch, with kerosene emulsion. In this case, however, spraying with crude oil or a strong kerosene emulsion just before the buds burst in spring would be advisable, so as to kill the eggs. It has been found that the young do not feed to any extent upon the apple trees after hatching; but upon weeds and other coarse vegetation near the ground. All such useless vegetation, therefore, should be kept closely mowed and the ground cultivated in infested orchards.

Forest and Shade Trees.

Perhaps the most noticeable occurrences of insects upon forest trees during the past season were the reappearance of the Larch Sawfly and the remarkable increase in the numbers of the Spruce Gall-louse, *Chermes abietis*, L. This latter insect has been the cause of considerable anxiety among growers of ornamental spruces for some years. It undoubtedly renders the trees very unsightly and gives them an unhealthy appearance; but I know of no actual instance where it has killed trees. The young issue from the cone-like galls about the middle of August and crawl about on the trees, where later eggs are laid from which hatch young plant-lice that remain on the twigs until the following spring. Their presence in the young buds of the spruces causes slight swellings at the base of the leaves. Each female of the May brood lays about 300 eggs and the young from these, cluster in the swellings begun by their mothers, where they soon cause the galls which later are so conspicuous. No treatment is possible upon forest trees; but, upon hedges and ornamental specimen trees, good work has been done by spraying them at the times the young plant-lice are exposed and before they are enclosed in the galls, with a tobacco and soap wash, or with kerosene emulsion. The two seasons of the year when the young plant-lice may be reached are in the latter part of August and in May. A good soap wash may be made by soaking ten pounds of tobacco leaves in enough hot water to cover them. Then strain off the liquid and add two pounds of whale oil soap. When dissolved, dilute to forty gallons of water. Two or three applications of this spray should be made at short intervals.

The Tussock Moth has been fully treated in other parts of this report so requires no special mention here.

The Larch Case-bearer (*Coleophora laricella*, Hbn.). During the past summer the European larches on the Experimental Farm, at Ottawa, were seen to have many bleached leaves on some of their branches and upon close examination it was found that the leaves were being eaten by large numbers of the small European Elachistid, *Coleophora laricella*, Hbn. This had been recorded previously on larch trees in America; but I am not aware of its ever having been observed in Canada. The injury was not very severe, but every new importation of this nature is worthy of consideration, and it is to be hoped that this latest visitor may not be equally injurious here as it is in the German larch forests. The larval case is somewhat similar to that of the Cigar Case-bearer of the Apple, but is rather shorter and pale drab in colour. The caterpillars have a curious habit, when full grown and ready to pupate, of fastening themselves in the centre of a fascicle of leaves, where they are difficult to detect. There is only one brood in the year, the moths of which appear in June. They are very small, of a satiny ashy gray in colour, with long antennæ and very long fringes to the wings. After pairing, the females lay their tiny yellow eggs singly on the needles of the larch. These soon after hatch and the larvæ eat their way into the slender needles, of which subsequently they make a very slender case about one-eighth of an inch long, in which they pass the winter attached to the twigs of the tree. As soon as the young buds begin to swell in spring, these minute caterpillars revive and feed upon the young leaves. The presence of the caterpillars upon a tree is easily recognized by the condition of the leaves, the terminal portion of which is bleached and soon shrivels. When the caterpillar attacks a leaf it eats a hole in the side, and, as it consumes the interior portion, it protrudes its body until it can reach no further without leaving its case. The winter case soon becomes too small, when it is split down the side and the emptied skin of another leaf is inserted. The case in which the Larch Case-bearer passes the winter, is straight and slender, not curved as in the case of the Cigar Case-bearer No parasites were reared, and the young larvæ are to be found in large numbers on the trees this autumn.

ENTOMOLOGICAL RECORD, 1905.

By James Fletcher, Dominion Entomologist, Ottawa.

Although few of the correspondents mentioned in the last Entomological Record, to all of whom it was sent, have expressed an opinion of its utility, I learn indirectly that it is highly valued by entomologists as a means of learning what is being done in the country, where species have been taken by our collectors, where these live, and what orders they are specially interested in. Most of this evidence, however, has been given gratuitously by specialists living outside of Canada.

Up to the present time the Entomological Record has been sent regularly to every active collector known to me in Canada. In future it will be sent only to those who acknowledge its receipt.

From the large number of records sent in, it is evident that some of our collectors do not understand the objects of publishing this paper. These were stated in our first issue and repeated in 1902. There is no idea of publishing year after year long lists of insects which have been taken within

their own range, but only such data as it is thought will be of value to students of geographical entomology and to those interested in life-histories, particularly the exact dates when various insects occur in the perfect state. It is hoped in this Record to publish a list of rare species or such as have not previously been noted as occurring in Canada; to give exact data as to the distribution of species together with dates when certain insects have been taken, so that localities may be visited and desirable species sought for at the time and place where they are known to have occurred; also to draw attention to works of particular value in the different departments of entomology, and to place on record anything which it is thought will encourage the study of insects in the Dominion.

A great many notes on captures have been sent in, and from these a selection has been made of such species as in the opinion of the writer or those specialists whom he has been able to consult, seemed worthy of recording. As in the past, great care has been exercised in endeavoring to arrive at correct determinations.

I have again to express great gratitude to the well-known specialists in the various orders who have so patiently identified large numbers of insects for Canadian collectors; and I am glad to know from these gentlemen that their own collections have been considerably enriched from the interesting northern and western Canadian material, much of which was unrepresented in the large collections of the United States. Particular mention in this direction must be made of Dr. J. B. Smith, of New Brunswick, N.J., who is untiring in his efforts to help all who apply to him. The same must be said of Prof. H. F. Wickham, of Iowa City, Iowa, Mr. W. D. Kearfott, of Montclair, N.J., and Dr. Skinner, of Philadelphia. Dr. L. O. Howard, U. S. Entomologist, and his expert associates, in the Bureau of Entomology, at Washington, have, as heretofore, given invaluable help in almost all orders of insects, to the many who have constantly asked for it.

The season of 1905 has been irregular, correspondents differing considerably in their opinion of it. On the whole, however, in most places it probably was a rather unproductive year. The cool nights and damp weather in many districts through the collecting season were very discouraging. Notwithstanding this, many good species were taken, and, as is always the case, energetic workers added many desirable species to their collections.

Among the important expeditions in our country, mention may be made of another extensive trip by Mrs. Nicholl, of Bridgend, South Wales, who again spent the summer in our Rocky Mountains and the mountains of Washington State, where she made large collections of butterflies and other insects. Another expedition of which up to the present time no report has been received, was made by Mr. J. Chester Bradley, of Ithaca, N.Y., together with a large party of naturalists, into the Selkirks, the mountains around Revelstoke and down the Columbia River. Mr. J. Keele, of the Geological Survey, Ottawa, brought back a small but most interesting collection of insects from the Yukon Territory. Among these were *Erebia Magdalena*, *Eurymus Boothii* and *Cœnonympha kodiak*—all insects of great rarity. Mr. W. J. Wilson, also of the Geological Survey, likewise made a collection of insects in the Hudson Bay country.

The collections of insects of our own Society at London, and those of the two Government institutions, viz., at the Central Experimental Farm, Ottawa, and at the Agricultural College, Guelph, have been materially increased during the past year; and it might be well for Canadian collectors to remember that there are a great many insects not represented in the cabinets of all these three institutions, and that specimens will always be acceptable.

Efforts are made to help applicants whenever possible with identifications, and the more complete these collections are, naturally of more use will they be to the whole country. We are glad to welcome Prof. Franklin Sherman, jr., at the Ontario Agricultural College at Guelph, and as his duties are more restricted than were those of his highly esteemed predecessor, Prof. W. Lochhead, we look for a rapid increase in the college collections. We would remind all our readers that as these Guelph collections, with the exception of Lepidoptera, are practically new ones, many species are entirely unrepresented, and, if properly labelled as to localities and dates, specimens in all orders taken in Ontario will be very acceptable to Prof. Sherman. Even unnamed material will be thankfully received.

Prof. Lochhead, who has done such good work at Guelph for many years, has severed his connection with the Agricultural College and has been appointed Biologist at the Macdonald College of Agriculture, Ste. Anne de Bellevue, Que. Doubtless he will soon make collections of insects for the Province of Quebec and will form at his College another centre for the accumulation and dissemination of knowledge concerning Canadian insects.

Literature.

Biographical notes on entomology appear regularly in all the entomological journals and scientific magazines, such as the *Canadian Entomologist*, the *Ottawa Naturalist, Entomological News, Journal of the New York Entomological Society, Le Naturaliste Canadien,* and *Psyche.* These publications are indispensable to the working entomologist. Among the articles upon North American moths, Mr. Wolley Dod's series of papers in the *Canadian Entomologist,* giving critical notes on the Noctuids he has taken at Millarville and Calgary are of the greatest value to students of Western Canadian insects.

Among the books which have appeared during 1905, some are of special importance to Canadian students.

Aldrich, J. M. A Catalogue of North American Diptera. Smithsonian Misc. Coll. XLVI., No. 1,444, 1905, pp. 680.—The latest catalogue of North American Diptera which has had to serve students until the present time was that by Baron Osten Sacken, published by the Smithsonian Institution in 1878. Many who would have taken up the study of flies have been prevented from doing so, for the lack of some systematic list by which they could arrange their collections. Prof. Aldrich has produced a most valuable contribution to entomology and there are few books which have appeared on this branch of science which have been so gladly welcomed as his catalogue. The work is done admirably and the greatest care has evidently been taken in searching literature and in verifying references. The references to Canadian publications are very complete and with this catalogue and the four Entomological Records which have appeared in our last four annual reports a check list of Canadian Diptera might now easily be made out. There has been an enormous increase in our knowledge of American flies during the last 27 years. In the present catalogue no less than 8,300 species are mentioned. The printing and general get-up of this work are as nearly perfect as can be. We congratulate the author in having finished so well this great work which has taken him seven years of patient labor.

Cook, Mel. T. The Insect Galls of Indiana (20th Annual Report Dept. Geology and Nat. Resources of Indiana, 1904, pp. 801 to 871).—We have received from Prof. Blatchley a separate copy of Mr. Cook's interesting and well illustrated pamphlet, which makes a fitting companion for Mr. Beutenmuller's bulletin on insect galls, noticed in our last issue. This will be found

a useful help to those who are now taking up this attractive subject. Biographical references under the different species are a noticeable feature.

KELLOGG, Vernon L. American Insects. Henry Holt & Co., New York. Pages 674; 13 colored plates; figs. 812 in text.—Prof. Kellogg gives us in this work a useful addition to the books on general entomology which will be appreciated by beginners and will be found interesting to all who consult it. It is more popular and more up to date in many respects than the two standard works of a similar nature, Comstock's "Manual for the Study of Insects" and Packard's "Text-book of Entomology." The author states in the preface that "the book is written in the endeavor to foster an interest in insect biology on the part of students of natural history, of nature observers and of general readers, and does, as it professes, provide in a single volume a general systematic account of the principal American insects. Comstock's classification, which is now generally adopted by American teachers, is followed and synoptic tables are given which will be found very useful to students. The whole work shows evidence of the writer's original investigations, but naturally the specialist is more apparent in certain places than in others.

The physiology of insects, their relations to the development of plants and as carriers of disease, are treated of at greater length than is usual in such works, and form valuable contributions to the literature of these subjects. The printing, paper and general get-up of the book are excellent. The colored plates are good and will be found a great attraction to many who wish for such a work as a present for boys and girls. A few of the text figures are poor, and there are a few instances of errors as to the names of species represented. These, however, are minor faults which can be corrected by an "errata" slip or in a future edition.

HAMPSON, Sir George F. (Bart.), Catalogue of the Lepidoptera Phalænæ in the British Museum. Vol V. Noctuidæ, 1905, pp. 634, plates 78 to 95.—This volume is a continuation of Sir George Hampson's monographs of the moths of the world, and gives the classification of the subfamily Hadeninæ as he understands it. "The subfamily is characterized by its trifid neuration of the hind wing combined with the hairy clothing of the eyes and forms an extremely natural and well-marked group of species." The generic names used will be found unfamiliar to American students. The old genus *Mamestra* is now included in *Polia*. Many species recognized in our lists are included as synonyms of other species. Possibly, however, larger series of specimens would enable the eminent author to change his judgment on some of these. The specific limits of many insects can only be decided after careful breeding from the egg, a class of work which is now receiving great attention in this country, and of which much is still to be done for many North American species. Some of the Canadian localities given are very vague and give little information as to distribution. The figures in the plates are for the most part excellent and about 160 species are shown which have already been or are likely to be found in the Dominion. It is noticeable what good work has been done by Mr. F H. Wolley-Dod in supplying Sir George Hampson with specimens.

OSBORN, Herbert. Jassidæ of New York State. (20th Report of the State Entomologist of New York, pp. 498-545.—This comprehensive list of the Jassidæ of New York is of special interest to hemipterists in Eastern Canada, as all the 175 specimens mentioned may be expected to occur with us. Prof. Osborn has for many years made a special study of the Jassidæ, so is well fitted to prepare this list. It is printed on good paper and in the admirable manner characteristic of Dr. Felt's reports. It contains copious bibliographical references and is carefully indexed in the general index to the Entomologist's report.

Skinner, Henry (M.D.). Synonymic Catalogue of North American Rhopalocera, Supplement No. 1.—A supplement to Dr. Skinner's Catalogue of 1898, giving references to the literature of the subject up to the end of 1904. This will be found a most useful help to students of North American diurnals and shows that a great deal of attention has recently been given to these attractive insects. No working entomologist can do without this supplement. Dr. Skinner's well recognized knowledge of North American diurnals makes his critical notes a valuable feature of the pamphlet, which is printed in the same neat and convenient style as the original catalogue. The genera, we are glad to see, appear under the same names as before, which seems preferable for the present at any rate.

Smith, J. B. (Sc.D.). Reports upon the Mosquitoes occurring within the State of New Jersey, their habits, life history, etc. Trenton, N.J., 1904, pp. 482.—Copiously illustrated with numerous figures and plates. No index. Many books and pamphlets have recently appeared upon mosquitoes and the mosquito question, but none, we think, so complete or of such general utility as this extensive report. The work has been done thoroughly, as all of Prof. Smith's work is, and his results are presented in a readable and intelligible manner, which must make the report very satisfactory to the people of the State of New Jersey, who provided the necessary funds for the large amount of work which was necessary in carrying out the experiments in draining large marshes, making of surveys, etc., as well as for the scientific biological work carried on in the laboratory. The report is well arranged. Part I. treats of mosquito characteristics and habits; Part II., checks and remedies; Part III., classification and descriptions; Part IV., local problems and surveys. Parts I. and III. will be of greatest interest to the systematic entomologist, no less than 37 species of New Jersey mosquitoes are described and fully illustrated. The whole work shows the capability of the author in carrying to a successful issue a work of great magnitude and also one demanding great scientific knowledge.

Van Duzee, E. P. List of Hemiptera taken in the Adirondack Mountains. (20th Report of the State Entomologist of New York, pp. 546-556.) Although less complete than Prof. Osborn's list of Jassidæ of New York, the present paper will be found to be of great value to Canadian students on account of the similarity of the fauna treated of and that of vast and varying areas in Canada. It is a most welcome addition to the literature of an order which requires many more students than so far have given their attention to it. Mr. Wm. Metcalfe of Ottawa has shown what good work may be done even in a restricted locality by an energetic collector.

Wright, W. G., The Butterflies of the West Coast of the United States. (The Wittaker & Ray Company, San Francisco, pp. 257, 31 plates, color photography (940 figures).—This handsome work, which has just come to hand, is uniform in size, style, paper and print with Dr. Holland's Butterfly Book, and the plates are equally beautiful in execution and are superior in the important feature that many more undersides are shown, particularly among the Argynnidæ and Lycænidæ, where this is of so much importance. Mr. Wright's name is so well known as a collaborator of Mr. W. H. Edwards that his work will be read with great interest by all the older students, although perhaps younger men will not altogether approve of the generic classification adopted. This, however, is, as the author points out, not a matter of very much moment so long as the specific names remain constant. He naively says: "Students should bear in mind that the species is the foundation. Genus and family names are more or less arbitrary. . . . When looking up a butterfly in the index, look for the specific name rather than

the genus or family name, because these latter names are found in all sorts of queer places, according to the fancy of the man who writes the list."

The first chapter, "General Features of Butterfly Life," consists of short essays giving the author's views on many subjects which will be read with interest, but with some of which lepidopterists will not agree. They are valuable as being founded on the author's personal experience and observation of the species treated, mostly in California. A complete list of the butterflies of the United States gives the names as classified by Mr. W. H. Edwards with the date of the original description. The names of the Pacific coast species are in full-faced type and the descriptions are numbered in the body of the book the same as the figure on the plates, which makes them very easy of reference. The points of difference between allied species are original, and coming from one with such long experience with the species mentioned will be very useful. This work will be of great value to our collectors in British Columbia, where many of the California species occur; but *Thecla blenina* and *T. spinetorum*, two species which probably they will first look for, will be a disappointment. The former, although referred to in the Index, is neither figured nor described, and *spinetorum* as figured is neither the insect which occurs in collections under that name, nor the closely allied *T. Johnsonii*, of Skinner. Our Vancouver Island friends will read with much amusement the description of their climate given under *Chionobas gigas*. Mr. Wright visited Mount Finlayson on July 3, 1891, for eggs of *C. gigas*. He says: "The males stay about the bare rock-knobs, flirting and playing during the few sunny hours that shine upon the rocks in that cloudy, raw climate." *C. gigas* and *nevadensis* are treated as different species, the latter being considered as more nearly related to *californica*.

The following is a list of the full names and addresses of the collectors referred to in the "Notes of Captures" for 1905:—

Anderson, E. M., Victoria, B.C.
Baldwin, J. W., Ottawa.
Bethune, Rev. C. J. S., London, Ont.
Bryant, Theodore, Wellington, B.C.
Bush. A. H., Vancouver, B.C.
Chagnon, Gus., Montreal.
Cockle, J. W., Kalso, B.C.
Criddle, Norman, Aweme, Man.
Dod, F. H. Wolley-, Millarville, Alta.
Draper, R., Vancouver, B.C.
Evans, J. D., Trenton, Ont.
Fletcher, Dr. James, Ottawa.
Fyles, Rev. T. W., Levis, Que.
Gibbon, Hugh, Miniota, Man.
Gibson, Arthur, Ottawa.
Grant, C. E., Orillia, Ont.
Hanham, A. W., Victoria, B.C.
Harrington, W. H., Ottawa.
Harvey, R. V., Vancouver, B.C.
Heath, E. F., Cartwright, Man.
Hudson, A. F., Millarville, Alta.
Jones, W. A. Dashwood, New Westminster, B.C.
Keen, Rev. J. H., Metlakatlah, B.C.
Keele, Jos., Ottawa.
Lyman, H. H., Montreal.
Marmont, L. E., Rounthwaite, Man.
Metcalfe, W., Ottawa.
Moore, W. H., Scotch Lake, N.B.
Perrin, Jos., McNab's Island, Halifax, N.S.
Sanson, N. B., Banff, Alta.
Taylor, Rev. G. W., Wellington, B.C.
Venables, E. P., Vernon, B.C.
Walker, Dr. E. M., Toronto.
Willing, T. N., Regina, N.W.T.
Wilson, W. J., Ottawa.
Young, C. H., Hurdman's Bridge, Ont.

NOTES OF CAPTURES.

Lepidoptera.

(Arranged according to Dyar's List of North American Lepidoptera, U. S. N. M. Bull. No. 52.)

RHOPALOCERA.

(Dyar's number).

21. *Papilio brevicauda*, Saunders. Larva found at the North-west River Post of the Hudson Bay Co., on Lake Melville, Ungava, (Lyman).

37. *Pontia protodice*, Bdv. & Lec. Second specimen taken at Ottawa, September 27, (Gibson).

41. *Nathalis iole*, Bdv. Perfect female taken Sept. 29 at Rounthwaite, Man., by Mrs. L. E. Marmont. A specimen of this insect was also taken at Cartwright, about 50 miles S. E. of Rounthwaite by Mr. Heath, about 20 years ago.

64. *Eurymus Boothii*, Curtis. Lansing River, Yukon Territory, June 24, Leduc River, Y. T., July 4, (Keele). Two fine males.

65. *Eurymus eurytheme*, Bdv., b. *eriphyle*, Edw. Millarville, Alta. Nov. 17; female quite fresh and very small, evidently of a third brood; a most exceptional record, (Dod).

74. *Eurymus palæno*, L. Leduc River, Y. T., July 4; Stewart River, above Boswell, Y. T., 2 males; Fraser Falls, Y. T., (Keele).

92. *Euptoieta claudia*, Cram. Baltimore, Ont. Larvæ in dozens destroying pansies, July 11, (T. M. Wood).

98. *Argynnis leto*, Behr. McLeod, Alta. July 3, 1904, (Willing).

119. *Argynnis Edwardsii*, Reakirt. Alameda, N. W. T., June 19, 1900, (Fletcher).

Phyciodes Hanhami, Fletcher. Rounthwaite, Man., July 7, Marmont.

194. *Phyciodes Barnesi*, Skinner. Okanagan valley, 1895, (C. deB. Green); Mr. E. M. Anderson, of Victoria, B. C., has shown me some specimens so named by Dr. Dyar; and, having examined into the matter, I have no doubt that what in the past I have been naming for correspondents as *P. mylitta*, Edw. is *Barnesi*, Skin., which was described by Dr. Skinner for this similar but much larger species. I have specimens of true *mylitta* which were taken at Agassiz and Mission in the Fraser valley, B. C., but had considered them as merely dwarfs of the form which has since been described as *Barnesi*. The males of the two species are much alike. Both are figured in Holland's Butterfly Book.

209. *Polygonia faunus*, Edw. Scotch Lake, N. B., (Moore). This fine Grapta was remarkably abundant all through Canada this season. As a rule, it is one of the rarest of the genus, notwithstanding its wide range.

216. *Eugonia californica*, Bdv. Rounthwaite, August 30, (Marmont).

270. *Erebia disa*, Thun., a. *mancinus*, D. & H. Lansing River, Y. T., June 24, (Keele).

275. *Erebia magdalena*, Strk. On mountain 12 miles up Hell River, Y. T., August 2, (Keele). A very rare insect.

282. *Cœnonympha kodiak*, Edw. Lansing River, Y. T., June 24, Leduc River, Y. T., July 4, (Keele); Atlin, B. C., (sent by T. Bryant).

286. *Enodia portlandia*, Fab. MacNab's Island, Halifax, N. S., (Perrin); Cartwright, Man., July 16 & 22, first time there. (Heath).

292. *Œneis jutta*, Hbn. North Fork, Stewart River, Y. T., June 22; Lansing River, Y. T., June 24; Leduc River, Y. T., July 4, (Keele).

Thecla Johnsoni, Skinner. Vancouver, B.C., end of May, (Draper); Stanley Park, Vancouver, June 9, 6 sp., (Harvey).

472. *Ancyloxypha numitor*, Fab. Orillia, Ont., Plentiful, never taken here before, (Grant).

490. *Erynnis pawnee*, Dodge. Rounthwaite, August 10, (Marmont).

504. *Anthomaster leonardus*, Harr. Ottawa, Sept. 1904, (Mrs. Nicholl); Britannia, Ottawa, August 23, 1904, (Baldwin). This has been very rare at Ottawa up to the present time; not taken for 25 years.

555. *Limochroes bimacula*, G. & R. London, Ont., (Bethune).

HETEROCERA.

657. *Lepisesia flavofasciata*, Wlk., a. *ulalume*, Strk. Evidently remarkably abundant this year at Vancouver, where many specimens were taken by Bush, Draper, Harvey and Jones. Mr. Cockle also caught the species at Kaslo and secured eggs for rearing.

659. *Lepisesia clarkiæ*, Bdv. Victoria, B. C., May 17, 25, 27, (Anderson).

701. *Sphinx drupiferarum*, S. & A. Kaslo, June 30, (Cockle); bred from larvæ which were abundant in orchards last year, Vernon, B. C., (Venables).

705. *Sphinx Vancouverensis*, Hy. Ed. Wellington, B. C., May 30, (Taylor).

836. *Utetheisa bella*, L. Ottawa, Sept. 25, (Fletcher). The second specimen seen at Ottawa, the other one being taken Sept. 20, 1877.

861. *Phragmatobia assimilans*, Wlk., a. *franconica*, Slosson. Ottawa, June 3, 1899, (Gibson); Meach Lake, Que., May 16 & 17, (Young).

875. *Apantesis virguncula*, Kirby. Ottawa, July 6, (Baldwin). A rare species at Ottawa.

880. *Apantesis anna*, Grt., a. *persephone*, Grt. Trenton, June 17, (Evans).

880. *Apantesis nevadensis*, G. & R. a. *incorrupta*, Hy. Edw. Fine specimens reared at Ottawa by Mr. Gibson from larvæ collected by Mr. Marmont, at Rounthwaite, Man.

891. *Apantesis celia*, Saunders. Ottawa, pupa May 9, imago June 7, (Baldwin).

895. *Apantesis vittata*, *Fab.* Ottawa, pupa May 1, imago May 26, (Baldwin).

895. *Apantesis vittata*, Fab., b. *phalerata*, Harr. Trenton, June 20, (Evans). I doubt very much that this is a variety of *vittata*.

982. *Apatela leporina*, L., var. *mœsta*, Dyar. Kaslo,, June 1 at sugar, (Cockle).

994. *Apatela furcifera*, Gn. *Aweme*, Man., June 6, 29, common at sugar, (Criddle).

1,000. *Apatela quadrata*, Grote. Miniota, Man., June 28, 1904, (Gibbon).

1,004. *Apatela superans*, Gn. Aweme, June 12, one specimen, first time taken here, (Criddle).

1,015. *Apatela mansueta*, Sm. Kaslo, one specimen at sugar, July 1, (Cockle).

1,075. *Baileya Doubledayi*, Gn. Hull, Que., June 3, (Gibson).

1,176. *Hadena didonea*, Sm. Ottawa, bred from larvæ boring in root shoots of *Phalaris arundinacea*, June 26, (Fletcher).

1212. *Hadena passer*, Sm. Regina, N.W.T., July 15, (Fletcher).

Hadena exhausta, Sm. Cartwright, (Heath).

1,221. *Hadena apamiformis*, Gn. Ottawa, June 28, (Gibson).

1,247. *Hadena cinefacta*, Grt. Regina, June 11, 30; July 3, 14, (Willing); Victoria, May 12, (Anderson).

1,273. *Polia contadina*, Sm. Victoria, Sept. 12, (Anderson).

1,281. *Hyppa brunneicrista*, Sm. Victoria, June 6, first one taken for 4 or 5 years, (Anderson).

1,302. *Laphygma frugiperda*, S. and A. Cartwright, Sept. 29, always scarce, (Heath). Aweme, Sept. 16, (Criddle).

1,312. *Homohadena badistriga*, Grt., var. *fifia*, Dyar. Yorkton, N.W.T., July 28, (Willing); Aweme, July 10, Aug. 3 and 12, (Criddle).

1,333. *Oncocnemis Saundersiana*, Grt. Aweme, Sept. 9, at light, (Criddle). Very rare in collections.

1,344. *Oncocnemis iricolor*, Sm. Aweme, Sept. 1, at light, (Criddle). A very rare species.

1,358. *Oncocnemis cibalis*, Grt. Millarville, Alta., Aug. 27, at light, not seen for years, (Hudson).

1,354. *Oncocnemis viriditincta*, Sm. Aweme, Aug. 22 and 31, at light, (Criddle).

1,370. *Adita chionanthi*, S. and A. Cartwright, one specimen, Aug. 19, first specimen appeared here about five years ago, (Heath).

Rhynchagrotis scopeops, Dyar. Kaslo, Aug. 26, at sugar, (Cockle).

Aplectoides discolor, Sm. (Jl. N. Y. Ent. Soc., Dec., 1905.) Mouth of Skeena River, June 29. Inverness, B.C., July 16, (Keen).

1,392. *Rhynchagrotis minimalis*, Grt. Kaslo, July 20-29, at sugar, (Cockle).

1,426. *Semiophora elimata*, Gn. Kaslo, Aug. 17, (Cockle); Meach Lake, Que., May 8, (Young).

1,427. *Semiophora opacifrons*, Grt. Meach Lake, Que., Aug. 7, (Young).

1,450. *Setagrotis infimatis*, Grt. Kaslo, Aug. 7, one specimen with a pink suffusion on upper side of primaries, Aug. 11, (Cockle).

1,453. *Agrotis aurulenta*, Sm. Aweme, June 16, 1904, (Criddle). A new locality for the species.

Noctua acarnea, Sm. (Jl. N. Y. Ent. Soc., Dec., 1905.) Banff, Alta., July 11, 1902, (Sanson).

1,498. *Noctua pyrophiloides*, Harvey. Kaslo, Aug. 3 and 20, at light, (Cockle).

1,500. *Noctua havilæ*, Grt. Cardston, Alta., June 21, 1902, (Fletcher).

1,506. *Noctua substrigata*, Sm. Rounthwaite, July 20, (Marmont).

Feltia obliqua, Sm. Millarville, May 25, at light, (Dod).

1,588. *Paragrotis brocha*, Morr. Vernon, Aug., (Venables).

1,590. *Paragrotis cogitans*, Sm. Millarville, Aug. 10, at light. One male only previously taken, (Hudson).

1,623. *Paragrotis detersa*, Wlk. Larva found at Youghall, N.B., on saltwort, *Salsola kali*. Very much like that of *Paragrotis scandens*, Riley. Moth emerged at Ottawa, Sept. 6, (Fletcher).

1,660. *Paragrotis incallida*, Sm. Millarville, Aug. 27, (Hudson); July 21, very rare of recent years, (Dod).

1,693. *Paragrotis mollis*, Wlk. Millarville, at light, July 30, a great rarity, (Hudson).

Paragrotis nesilens, Sm. Cartwright, July 3, (Heath); Aweme, July 10, (Criddle); Millarville, July 17, Aug. 25, at light, (Hudson).

Paragrotis maimes, Sm. Cartwright, one at sugar, Sept. 4, always a rarity, (Heath); Millarville, Aug. 12 and 27, (Hudson). This is the species previously known in Canada as *Ridingsiana*, Grt., which, however, is a southern species.

1,731. *Paragrotis acutifrons*, Sm. Cartwright, at sugar, a single specimen, (Heath).

1,732. *Paragrotis nordica*, Sm. Millarville, at light, July 28, (Hudson).

1,881. *Barathra occidentata*, Grt. Abundant from middle of June to 1st of July at Ottawa, (Young, Gibson, Baldwin, Fletcher). Specimens also sent from Nova Scotia, (Dr. C. A. Hamilton), Quebec, (Fyles), and also found at Nepigon.

1,885. *Morrisonia sectilis*, Gn., a. *vomerina*, Grt. Toronto, May 9, 1898, (Gibson); Aweme, May 16, (Criddle).

1,910. *Scotogramma uniformis*, Sm. Kaslo, at light, Aug. 8, (Cockle).

1,953. *Heliophila unipuncta*, Haw. Wellington, B.C., March 2, (Bryant).

2,026. *Graphiphora peredia*, Grt. Cartwright, at sugar, Aug. 8, several subsequently, (Heath).

2,096. *Xylina amanda*, Sm. Cartwright, at sugar, Aug. 31, (Heath).

Xylina ancilla, Sm. Cartwright, at sugar, Aug. 31, Sept. 3, (Heath).

2,142. *Rancora strigata*, Sm. Vernon, Ap. 5, (Venables).

2,175. *Papaipema Harrisii*, Grt. Bred from *Heracleum lanatum* on the Restigouche River, N.B., (Lyman); Cartwright, one specimen, (Heath).

2,179. *Papaipema nitela*, Gn. Fargo, Ont. Although frequently recorded from Canada as a pest on potatoes and corn, these are the first specimens I have actually seen. Most of the previous records referred to *P. cataphracta*. Larvæ buried at Ottawa, Aug. 2, and moths appeared Sept. 6. (Fletcher.)

Papaipema thalictri, Lyman, var. *perobsoleta*, Lyman. Bred from roots of *Thalictrum cornuti* at Montreal West, (Lyman).

2,180. *Papaipema nelita*, Strk. Cartwright, one at light, (Heath).

2,184. *Papaipema frigida*, Sm. Cartwright, at light, Aug. 8. This is a rarity and is somewhat like a large *nelita*, (Heath.)

2,205. *Conservula anodonta*, Gn. Meach Lake, Que., July 12, (Young).

2,288. *Nycterophæta luna*, Morr. Rounthwaite, May 25, 1901, (Marmont); Millarville, July 6, asleep on thistle head in sunshine, open prairie near Red Deer River, 50 miles north-east of Gleichen, (Dod). Mr. Marmont's record was sent in in 1901 but was accidentally overlooked.

Melicleptria sexata, Sm. Aweme, July 21, (Criddle).

2,473. *Polychrysia formosa*, Grt. Meach Lake, Que., Aug. 15, (Young).

2,494. *Autographa rubidus*, Ottol. Meach Lake, Que., June 5, (Young).

2,496. *Autographa brassicæ*, Riley. Kaslo, common, (Cockle); Vancouver, June 14, (Anderson); Ottawa, Aug. 16, (Gibson); Rounthwaite, common, Marmont).

2,551. *Marasmalus inficita*, Wlk. Orillia, at light, (Grant); Montreal, July 1, (Chagnon).

2,555. *Alabama argillacea*, Hbn. Cartwright, Sept. 1, (Heath); Levis, Que., (Fyles). The Cotton Moth was abundant in many places in eastern Canada for a few days in the beginning of Sept., but not in such numbers as it sometimes appears.

2,623. *Prothymia rhodarialis*, Wlk. Orillia, at light, (Grant).

2,766. *Melipotis fasciolaris*, Hbn. Ottawa, at rest in yard, July 6, (Baldwin). A remarkable capture. The species is a native of the West Indies

and was probably brought in with bananas. The Ottawa Fruit Exchange building is close to Mr. Baldwin's house.

2,788. *Syneda ochracea*, Behr. Vernon, June, (Venables).

2,844. *Catocala augusta*, Hy. Edw. Kaslo, (Cockle).

2,858. *Catocala coccinata*, Grt. Cartwright, two or three each year. This is much smaller than *parta*, though like it at first sight, (Heath).

Bomolocha lutalba, Sm. Cartwright, July 10, (Heath).

3,072. *Bomolocha toreuta*, Grt. Aweme, June 18, (Criddle).

3,128. *Dasylophia thyatiroides*, Wlk. Ottawa, June 24, (Young); Toronto, June 6, (Gibson).

3,147. *Ianassa pallida*, Strk. Kaslo, Aug. 3, (Cockle).

3,211. *Tolype laricis*, Fitch. Orillia, two specimens at light, (Grant).

3,226. *Oreta rosea*, Wlk. St. John's, Que., July 29, (Chagnon). The larva feeds on *Viburnum cassinoides* in peat bogs.

6,606. *Sthenopis thule*, Strk. Ottawa, July 6, (Gibson). This is the only specimen so far known with certainty to have been taken at any other place than Montreal. Mr. Gibson also saw two more specimens the following evening; but, although sought for carefully then and for several days afterwards, no others were seen.

6,608. *Hepialus hyperboreus*, Moesch. Kaslo, one specimen, bright reddish orange, no silver, (Cockle).

Coleoptera.

(Arranged according to Henshaw's List of the Coleoptera of America, North of Mexico.

25f. *Cicindela limbalis*, Kl. Calgary, May 17, (Willing).

34. *Cincindela pusilla*, Say. Rounthwaite, Man., Aug. 24, (Marmont), Vernon, B.C., an almost immaculate specimen, (Venables); Okanagan Falls, B.C., July 20, 1895, (Fletcher).

156. *Elaphrus Lecontei*, Crotch. Olds, Alta., June, (Willing).

184. *Nebria diversa*, Lec. Albert Head, Vancouver Island, B.C., Aug. 1, under drift among sand dunes, very active and pale in color like the sand, (Hanham).

1,216. *Amphizoa Lecontei*, Matth. Vernon, (Venables). Quite a rare species, but known from several places in the Rocky Mountain system (Wickham.)

1,696. *Necrophorus Sayi*, Lap. Montreal, Sept. 27, at light, (Chagnon).

1,707. *Silpha trituberculata*, Kirby. Tofield, Alta., July 27, (Willing).

2,180. *Philonthus discoideus*, Gray. Trenton, Aug. 20, (Evans); Ottawa, one specimen, (Harrington).

2,115. *Quedius vernix*, Lec. Montreal, under dead leaves, Sept. 2, (Chagnon).

2,128. *Staphylinus erythropterus*, L. Ottawa, flying, May 4, (Gibson). This rare and beautiful species resembles *badipes*, but has red elytra and two rows of golden spots, one down each side of dorsum.

2,434. *Stenus croceatus*, Casey. Trenton, Sept. 17, (Evans); Ottawa, Oct. 10, (Harrington).

2,825. *Lathrimæum pictum*, Fauv. Goldstream, B.C., abundant in Skunk cabbage, *Lysichiton*, early in the season, (Hanham).

2,854. *Homalium rufipes*, Fauv. Trenton, May 15, (Evans).

3,043a. *Hippodamia mœsta*, Lec. Goldstream, Victoria, a late summer species, rare, found on thistles, etc., (Hanham).

3,118. *Hyperaspis postica*, Lec. Goldstream, by sweeping, August, (Hanham). Described from California.

3,168. *Scymnus Phelpsii*, Cr. Victoria, on fences, Sept., (Hanham).

3,179. *Phymaphora pulchella*, Newm. Montreal, on dead birch partly covered with fungi, Sept. 29, (Chagnon).

3,223. *Mycotretus pulchra*, Say. Trenton, Aug. 26, (Evans). Rare at Ottawa in fungus.

3,403. *Triphyllus elongatus*, Lec. Goldstream, early summer, (Hanham).

3,505. *Hister sedecimstriatus*, Say. Montreal, in cow dung, June 15, (Chagnon).

3,971. *Macropogon testaceipennis*, Mots. Goldstream, June 28, beaten off *Arbutus Menziesii* only; rare, (Hanham).

3,984. *Aræopus monachus*, Lec. Vernon, (Venables).

3,993. *Eucinetus terminalis*, Lec. Montreal, from sweepings in marshy land, Sept. 21, (Chagnon).

4,083. *Adelocera profusa*, Canad. Vernon, under pine bark, May, (Venables).

4,218. *Elater nigrinus*, Payk. Trenton, June 20, (Evans).

4,224. *Elater vitiosus*, Lec. St. Hilaire, Que., July 1, (Chagnon); Ottawa, one specimen, (Harrington).

4,247. *Elater obliquus*, Say. Trenton, June 30, (Evans).

4,343. *Melanotus sagittarius*, Lec. Montreal, May 4, (Chagnon); Ottawa, one specimen, in spring, (Harrington).

4,369. *Limonius subauratus*, Lec. Vancouver, May 16, (Harvey).

4,382. *Pityobius anguinus*, Lec. Six specimens of this fine elater were taken at electric light, Ottawa, June 28, (Gibson and Baldwin).

4,474. *Corymbites sagitticollis*, Esp. Vancouver, May 16, (Harvey).

4,498. *Corymbites rotundicollis*, Say. Specimens of the Pacific form that passes by this name were taken by Mr. Hanham at sugar and on fences. (Wickham.)

4,587. *Dicerca sexualis*, Cr. Vancouver, June 20, (Harvey).

4,738. *Agrilus acutipennis*, Mann. St. John's, Que., June 25, (Chagnon).

4,836. *Photinus marginellus*, Lec. Rare at Ottawa, (Harrington); Trenton, Aug. 8, (Evans).

5,020. *Endeodes collaris*, Lec. Albert Head, Victoria, Aug. 3, on sandy beach under moist seaweed, (Hanham); all of our species of *Endeodes* are found in such locations along the Pacific coast and are remarkable for their curious short elytra. (Wickham.)

5,164. *Clerus spinolæ*, Lec. Victoria, (Anderson).

5,177. *Clerus nigriventris*, Lec. Vernon, (Venables).

5,356. *Amphicerus bicaudatus*, Say. Regina, Oct. 6, 1900, (Willing).
Donoderus pacificus, Casey. Banff, Alta., July 13, (Willing).

5,432. *Canthon simplex*. Lec. Vernon, (Harvey).

5,439. *Onthophagus janus*, Panz. Trenton, May 9, (Evans).

5,557. *Aphodius scabiceps*, Lec. Aweme, Sept. 19, (Criddle). Described from Colorado and so far not reported from any other locality. (Wickham.)

5,659. *Dichelonycha testacea*, Kirby. Saltcoats, N.W.T., July 12, (Willing).

6,233. *Centrodera decolorata*, Harr. Montreal, June 14, at light, (Chagnon).

6,428. *Liopus fascicularis*, Harr. Trenton, July 9, rare, (Evans).

6,478. *Saperda calcarata*, Say, var. *adspersa*, Lec. St. John's, Que., Aug. 27, (Chagnon).

6,560 (10,337). *Syneta hamata*, Horn. Vernon, May, (Venables).

6,599. *Saxinis saucia*, Lec. Vernon, (Venables).

6,959. *Disonycha rufa*, Ill. St. Hilaire, Que., on willows, June 28, (Chagnon).

7,303. *Cœlus ciliatus*, Esch. Victoria. Prof. Wickham so names the species I recorded as *globosus* in last Ent. Record. (Hanham.)

7,396. *Cœlocnemis dilaticollis*, Mann. Goldstream. This is our largest Tenebrionid. It ocurs rarely on dry hillsides under logs, etc., August and later, (Hanham).

7,484. *Uloma longula*, Lec. Goldstream, July, under bark of fallen Douglas fir, (Hanham).

7,666. *Serropalpus barbatus*, Schall. Oak Bay, Victoria, B.C., Sept. 1, at sugar, (Hanham).

7,724. *Calopus augustus*, Lec. Enderby, B.C., April, (Venables).

7,729. *Ditylus gracilis*, Lec. Vancouver, (Harvey).

Xanthochroa testacea, Horn. Albert Head, beaten from *Spiræa*, July 31, (Hanham). As yet this Œdemerid is rare in collections. (Wickham.)

7,872. *Eurygenius campanulatus*, Lec. Goldstream, June, only taken on the ground in cultivated fields, (Hanham).

7,874. *Stereopalpus vestitus*, Say (*badiipennis*, Lec.). Sandhills near the big Douglas swamp, Manitoba, June, (Hanham).

8,240. *Trigonoscuta pilosa*, Mots. Victoria, among roots on sea beach, one pair, (Hanham). Not uncommon further south, but this Vancouver Island record is of interest. (Wickham.)

8,270. *Amnesia decorata*, Lec. Goldstream, occasional under stones, (Hanham).

8,349. *Sitones crinitus*, Gyll. (following LeConte). Olds, June 5, (Willing).

8,357. *Trichalophus simplex*, Lec. Regina, July and August, (Willing).

8,526. *Cleonus vittatus*, Kirby. Victoria, one pair, (Hanham). Uncommon so far north. (Wickham.)

8,641. *Anthonomus sycophanta*, Kirby. Olds, in a gall on willow, Sept. 5, (Willing). Occurs from New Hampshire to District of Columbia, from Oregon to Southern California. (Wickham.)

8,687. *Proctorus armatus*, Lec. North of Olds, June. Prof. Wickham says this is very rare in collections, (Willing).

9,207. *Allandrus bifasciatus*, Lec. Abernethy, N.W.T., June 28, (Willing).

Orthoptera.

Some collections have been made of Orthoptera, but even yet this important field for good work is almost untouched. Dr. Walker, of Toronto, has been in Europe during the greater part of the past collecting season; but one or two other students have taken up the study, and it is probable that next year will show a considerable advance in our knowledge of Canadian locusts and their allies. The following records of species of some interest have been received:—

Ageneotettix Scudderii, Brun. Aweme, Aug. 1, (Criddle).

Amphitornus bicolor, Thom. Aweme, July 21, Aug. 1, (Criddle).

Arphia pseudonietana, Thom. Aug. 12, Vernon, (Venables).

Chloealtis conspersa, Harr. This is *conspersa*, but is colored like the western *abdominalis*. The sides of the pronotum are not shining black as in

all the specimens of *conspersa* I have seen before, but are dark only in the upper half as in *abdominalis*. The latter is a Rocky Mountain form which I have taken at Banff and in Manitoba, and also along the Severn River, Ont. (Walker.) The above specimens were taken on Anticosti Island by Dr. J. Schmitt in 1903.

Chloealtis conspersa, Harr., var. *prima*, Morse. Grimsby, Ont., Aug. 22, 1904, (Metcalfe), also recorded from Lake Simcoe by Walker. (A. N. Caudell.)

Conocephalus nebrascensis, Brun. Grimsby, Aug. 12, Sept. 3, 1894, (Metcalfe).

Cordillacris cinerea, Brun. Aweme, July 7, Aug. 8, (Criddle).

Gomphocerus clavatus, Thom. New Lunnon, Alta., July 22, (Fletcher); Aweme, (Criddle).

Hippiscus latifasciatus, Scudd. Aweme, June 15, (Criddle).

Hippiscus tigrinus, Scudd. Aweme, May 25, (Criddle).

Mecostethus gracilis, Scudd. New Lunnon, Alta., July 27, (Fletcher); Aweme, Sept. 6, (Criddle).

Mecostethus lineatus, Scudd. Anticosti Island, (Dr. Schmitt). Male and female. These differ from Ontario specimens in having a dark ring on the hind tibiæ near the base, and in the shorter tegmina and wings; the female also differs in the pronotum, which is more contracted before the middle. (E. M. Walker.)

Melanoplus bilituratus, Walk. Aweme, July 4, (Fletcher and Criddle).

Melanoplus Dawsoni tellustris, Scudd. Aweme, (Criddle).

Melanoplus extremus junius, Dodge. Aweme, July 7, (Criddle and Fletcher).

Melanoplus fasciatus volaticus, Scudd. Edmonton, Alta., (Fletcher).

Nemobius griseus, Walk. Toronto, Oct. 8, 1903, (Metcalfe).

Spharagemon Bolli, Scudd. Aweme, July 27, (Criddle).

Stenobothrus acutus, Morse. Edmonton, Alta., (Fletcher).

Stirapleura decussata, Scudd. Aweme, May 24, (Criddle).

Tettix ornatus triangularis, Scudd. Toronto, April 4, 1904, (Metcalfe).

Trimerotropis citrina, Scudd. Vernon, B.C., Aug. 25, (Venables).

Odonata.

This order has not yet received from Canadian entomologists the attention which it deserves; but an effort will be made to draw more attention to it, as there are doubtless a great many interesting species in Canada which have not yet been recorded. The few collections which have been submitted to specialists, have all contained species of interest, and this attractive order presents a field well worthy of study. The life-histories of many species are unknown, and the habits of the larvæ of all make them very desirable objects for an aquarium. Dr. E. M. Walker, of Toronto, has collected for some time and has now a collection of about 65 species found in Ontario. He has kindly named any specimens I have submitted to him, and the following notes are made from letters which he has written. The species mentioned are the most interesting of a large number which have been submitted to him or which he has taken himself recently.

Calopteryx æquabilis, Say. Algonquin Park, Ont., July 25, 1900, (Prof. John Macoun). The same locality, Aug. 31, 1902, (Dr. E. M. Walker).

Ophiogomphus rupinsulensis, Walsh. North River, Algonquin Park, Aug. 13 to 30, 1902-03, (Walker).

Hagenius brevistylus, Selys. Lake Simcoe, July, Algonquin Park, Aug. 20, (Walker).

Lanthus albistylus, Selys. North River, Algonquin Park, Aug. 14, (Walker).

Somatochlora forcipata, Scudd. A very rare and interesting species of northern range. One male, Algonquin Park, July 15, (Macoun); Isle of Orleans, Que., Aug. 30, (Walker).

Gomphus Scudderi, Selys. North River, Algonquin Park, Aug. 20, 1903; Aug. 30, 1902, (Walker).

Gomphus furcifer, Hagen. High Park and East Toronto, June 15, (Walker).

Dromogomphus spinosus, Selys. Lake Simcoe, July to Sept., (Walker).

Macromia illinoiensis, Walsh. Lake Simcoe, July to August, Algonquin Park, Aug., (Walker).

Dorocordulia libera, Selys. Lake Simcoe, July 8, (Walker).

Ladona julia, Uhler. Algonquin Park, July 5, (Macoun).

Tramea carolina, L. One male of this fine large southern dragon fly was taken by Dr. E. M. Walker, in High Park, Toronto, May 24, 1904.

Diptera.

(Arranged according to a Catalogue of North American Diptera by J. M. Aldrich (Smithsonian Mis. Col. XLVI. No. 1,444.) The numbers refer to the pages of the Catalogue.)

166. *Bibio nigripilus*, Loew. Common in April, Vancouver, (Harvey); Victoria, (Anderson).

179. *Sargus decorus*, Say. Victoria, (Anderson).

202. *Tabanus captonis*, Marten. Mt. Arrowsmith, B.C., July 28, (Fletcher).

203. *Tabanus epistatus*, O. S. Sumner, N.W.T., June 23, 1903, (Willing); Deloraine, Man., Ottawa, June 23, 1903, (Fletcher).

204. *Tabanus illotus*, O. S. Moosomin, N.W.T., June 23; Tantallon, N.W.T., July 23; Prince Albert, N.W.T., July 23, (Willing); Indian Head, N.W.T., July 1, (Fletcher).

204. *Tabanus lasiophthalmus*, MacG. Ottawa, 29 May, (Fletcher).

204. *Tabanus lineola*, Fab. Ottawa, Aug. 8, (Fletcher).

Tabanus Osburni, Hine. Deloraine, Man., 1902, (Fletcher).

207. *Tabanus Reinwardtii*, Wied. Millarville, Alta., July 27, 1903, (Dod).

207. *Tabanus septentrionalis*, Loew. McLeod, Pincher, Pine Creek, Spruce Grove, Tofield, all N.W.T., July 2-27, (Willing).

207. *Tabanus sonomensis*, O. S. June 20, Vancouver, (Harvey); Mt. Arrowsmith, B.C., July 28, (Fletcher).

209. *Tabanus vivax*, O. S. Little Current River, Hudson Bay slope, 22 July, 1903, (Wilson).

209. *Tabanus zonalis*, Kirby. Mamamattawa, Hudson Bay slope, 21 June, 1903, (Wilson).

230. *Anthrax eumenes*, O. S. Victoria, (Anderson).

259. *Cyrtopogon dasylloides*, Will. Victoria, (Anderson).

351. *Paragus bicolor*, Fab. Victoria, (Anderson).

352. *Chilosia lasiophthalmus*, Will. Victoria, (Anderson).

361. *Melanostoma stegnum*, Say. Common, end of April, Vancouver, (Harvey).

363. *Didea laxa*, O. S. One male, April 24, Vancouver, (Harvey).

363. *Lasiophthalmus pyrastri*, L. Victoria, (Anderson).

364. *Syrphus americanus*, Wied. Common, April-May, Vancouver, (Harvey).

365. *Syrphus diversipes*, Macq. Common, April-May, Vancouver, (Harvey).
366. *Syrphus macularis*, Zett. Victoria, (Anderson).
366. *Syrphus intrudens*, O. S. Common, April-May, Vancouver, (Harvey).
368. *Syrphus torvus*, O. S. Common, April-May, Vancouver, (Harvey).
382. *Sericomyia chalcopyga*, Loew. Victoria, (Anderson).
383. *Pyritis Kincaidii*, Coq. Victoria, (Anderson).
400. *Chrysochlamys crœsus*, O. S. Victoria, (Anderson).
402. *Criorhina Kincaidi*, Coq. Common, March to May, at willows and salmon-berry, *Rubus spectabilis*, Vancouver, (Harvey).
403. *Criorhina tricolor*, Coq. Two at end of May, Vancouver, (Harvey).
404. *Spilomyia fusca*, Loew. One pair, Trenton, Ont., Aug. 27, (Evans).
430. *Clausicella Johnsoni*, Coq. Ottawa, 26 June, (Metcalfe).
472. *Blepharipeza adusta*, Loew. April 30, Vancouver, (Harvey).
489. *Epalpus bicolor*, Will. One, Sept., Vancouver, (Harvey).
520. *Calliphora viridescens*, Desv. Victoria, (Anderson).
525. *Pyrellia cyanicolor*, Zett. Common, April, Vancouver, (Harvey).
563. *Lispa tentaculata*, De G. Victoria, (Anderson).

A good many flies have been collected during 1905, but very few of the eastern records sent in are of special interest. Those given above are almost all from the west, and most of them are additions to the Canadian list. All the identifications have been made by leading specialists.

INJURIOUS INSECTS OF THE FLOWER GARDEN.

By Arthur Gibson, Division of Entomology, Central Experimental Farm, Ottawa.

Growers of flowering plants in gardens are often troubled with insect enemies of various kinds. Some of these attack the foliage, others the flowers, while others again bore into the stems and even into the roots. As the subject is an important one, an effort has been made to bring together such information as we had concerning certain little-known species, and to add, at the same time, short notes on some of the more regularly occurring pests in flower gardens, some of which may appear in destructive numbers during any season.

Injurious insects may be divided into two classes: (1) those kinds which bite their food, such as caterpillars, beetles, etc., and (2) those which suck up their food in a liquid form, by means of their beaks, such as the true bugs, plant lice, etc. When insects, therefore, are noticed doing harm to any plant, the first thing to do is to decide by the nature of the injury to what class they belong. If they are biting insects, some poison, such as Paris green, must be placed upon the food which will be eaten with it. If, however, they are sucking insects, some material which will kill by contact, such as kerosene emulsion, or whale oil soap, must be used. For the convenience of applying liquid applications to the foliage of plants a small spraying pump will be found useful. Good hand pumps suitable for use in ordinary flower gardens may be now purchased at a small cost, but it will pay in the end to get a good pump, even if this should be a few dollars more.

There are some insects, such as the borers, which cannot be reached by any outside application of spraying materials. Injury to plants by these insects, which work inside the stems and roots, is often of a serious nature

and should be met with preventive remedies. In some cases the only thing to do is to cut out the infested part if this is possible, or destroy the whole plant so as to reduce the numbers of the insect.

It must be remembered, however, that all insects which occur in gardens are not injurious kinds. There are beneficial ones as well, which are continually doing good by destroying those species which do harm. These beneficial kinds should all be known to the gardener. Foremost amongst them are the different kinds of ladybird beetles (Fig. 35), which, both in their larval and adult stages feed almost exclusively upon plant-lice and scale insects.

Fig. 35. Lady-bird beetles.

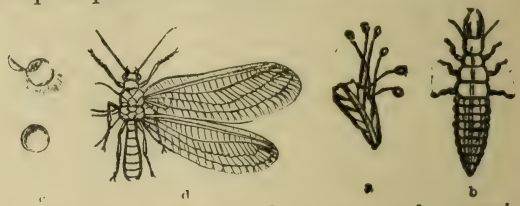


Fig. 36. Lace-wing fly; eggs much magnified; the fly, showing one pair of wings only; the eggs on their stalks; the larva.

Another kind of beetle, the Fiery Ground beetle, *Calosoma calidum*, Fab., is a particularly useful insect. This beetle, and its voracious black grub, which is called the Cutworm Lion, destroy enormous numbers of cutworms. The beetle shown in the figure is brownish black, with the wing cases spotted with coppery red in nearly all the eastern specimens. The appearance and habits of this good friend should be known to everyone. (Fig. 37.)

Other well-known beneficial insects belong to the parasitic Hymenoptera, four-winged flies, and to the Diptera, or two-winged flies. The females of these large groups of flies deposit their eggs upon or in the bodies of cutworms and other injurious caterpillars. These eggs soon hatch and the young larvæ at once begin to feed upon the living caterpillar, which of course soon dies. The different kinds of Lace-wing flies (Chrysopa species) (Fig. 36) are also good friends of the gardener, their larvæ working particularly among the plant lice.

Fig. 37. The Fiery Ground-beetle and its larva, the Cutworm Lion.

Fig. 38. Agrotis ypsilon; cut worm and moth.

INSECT PESTS OF IMPORTANCE.

Cutworms. These destructive insects are very troublesome in flower gardens, and when they are at all abundant no plants seem to be exempt from their attacks. The moths of some of the species lay their eggs in fall, others in spring, and some species pass the winter either as a pupa or a half-grown

larva. Their ravages are most noticeable in the spring, just as young seedlings appear above the ground, or when annual plants have been set out. As they feed chiefly at night, their injury is quite apparent in the morning, when plants may be seen to have been cut or eaten off at the surface, or even a little below it. If the earth around such plants is examined, coiled up, dirty gray, or reddish brown, smooth caterpillars, about an inch or more in length, will be seen. Around some plants the writer has found as many as nineteen. They are all of some dull shade of color similar to the ground in which they hide during the day. When they occur in large numbers and their food supply is short, they feed by day as well as by night. In Ontario the two kinds which have given the most trouble in flower gardens are the Red-backed Cutworm, *Paragrotis ochrogaster*, Gn., and the Dark-sided Cutworm *Paragrotis messoria*, Harr. These two cutworms often occur together and it is sometimes difficult to distinguish between the two. Other cutworms which are present in some numbers almost every season, and which occasionally do serious damage, are the White Cutworm, *Paragrotis scandens*, Riley, the Spotted Cutworm, *Noctua c-nigrum*, L., and the Greasy Cutworm, *Agrotis ypsilon*, Rott. (Fig. 38). The Variable Cutworm, *Mamestra atlantica*, Grt., the moths of which are very abundant some seasons, may at any time do harm. (Fig. 39 shows another common moth of this family.)

During the past season, another kind of cutworm, that of *Barathra occidentata*, Grt., made its first appearance in Canada as a pest of importance. The moths of this species were very abundant at Ottawa in June, and later the larvæ appeared in considerable numbers and did serious damage to larkspurs, bleeding hearts, pansies, violets, etc.

As the habits of cutworms are very similar, the same remedy is applicable to all the species. As soon as their presence in a garden is detected, the well-known poisoned bran remedy, which has lately come into such wide use, should be applied. This is made by simply moistening some bran with a little sweetened water and gently dusting in Paris green, so that all the particles of the bran will be poisoned. The whole should be mixed thoroughly together and then placed in small quantities near, but not touching, the plants to be protected. Half a pound of Paris green is sufficient to poison fifty pounds of bran.

Fig. 39. Agrotis Subgothica.

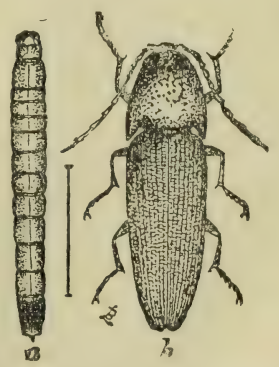


Fig. 40. Wire worm and beetle.

White Grubs. (*Lachnosterna.*) The roots of many kinds of flowering plants are often eaten by the larvæ of May Beetles, or June Bugs. These larvæ, which are known as White Grubs, usually occur in land which has been in sod for several years. (See Fig. 6.) During the past season at Ottawa the roots of asters and other annuals were eaten, causing the death of

many plants. As these White Grubs take so long to come to maturity, there is no time during the growing season that they do not attack plants. Unfortunately the only remedy which has given any degree of success in garden practice, is the ploughing or digging up of the land in late autumn, by which time the larvæ will have made their winter cells; but where many perennials are grown this would be difficult. This disturbing of the soil in autumn breaks up their cells and exposes the larvæ and pupæ to the cold of winter. In spring, when the ground is dug again, all White Grubs seen should be picked up and destroyed. At this time if it is at all possible, should the infestation be severe, poultry or pigs may be turned into the garden. These animals are very fond of White Grubs and it is claimed they will soon rid a piece of land of them. In cities and towns it would hardly be possible to use pigs for this purpose, but poultry might in many cases be used to advantage.

Wireworms. (Fig. 40.) Occurring sometimes with White Grubs, but more often by themselves, are slender yellowish, or reddish-brown, shining grubs, which feed on the roots of almost all kinds of plants, and have somewhat the same habits as the White Grubs. These are Wireworms, the larvæ of the Click-beetles. The digging up or disturbing of the soil twice in autumn, first in August, to destroy the tender pupæ, and in October or later, which will expose the newly formed beetles to the cold of winter, as mentioned under White Grubs, is also of use in reducing the numbers of this class of insects.

Tarnished Plant Bug. *Lygus pratensis*, L. This common plant bug is troublesome, more or less, in gardens almost every season. When it is very abundant it is a difficult insect to combat. It not only sucks the juices from the leaves, but also attacks the flowers of many annual and perennial plants, causing them to become distorted. The spraying of the infested plants with kerosene emulsion or whale oil soap may be resorted to, or they may be dusted with insect powder, but these remedies are not always satisfactory. These bugs are most active during the heat of the day, but in the early morning they are comparatively sluggish, at which time they may be beaten off the plants into an inverted umbrella and then put into some receptacle containing coal oil and water. As this insect passes the winter in the perfect state, all garden rubbish should be burned in the fall. This practice of cleaning up gardens is important, as it reduces the shelters which harbor this and many other kinds of injurious insects.

The Four-Lined Leaf-Bug. *Pœcilocapsus lineatus*, Fab. Another plant bug which is very destructive at times, and which is a bright greenish-yellow insect, three-tenths of an inch long, with two black spots on the thorax and four stripes of the same color down the back, is the Four-lined Leaf-bug. This insect, unlike the Tarnished Plant Bug, passes the winter in the egg state, the eggs being laid in the autumn in the terminal twigs of currant and other bushes. The eggs hatch the following spring and the young nymphs at once begin to feed on the foliage, which soon becomes spotted with brown. The eggs are white and once they are known, it does not take very long to look over a bush and clip off the shoots containing them. When the insects have been troublesome during the summer, the eggs should be looked for in the fall and destroyed. A strong kerosene emulsion (1 to 6) will reduce the numbers of the nymphs and perfect insects. Pyrethrum insect powder dusted on the plants is also useful, as well as the beating of the insects into open pans containing coal oil and water. The plants most attacked in gardens are sage, mint, gooseberry, currant, weigelias, dahlias and snap-dragon.

Fig. 41. Plant-lice.

Fig. 42. Plant-lice.

Plant Lice. (Figs. 41 and 42.) This class of injurious insects, which are chiefly known from their attacks on shrubs and trees of various kinds, as well as upon plants in vegetable gardens, are every year the cause of much damage in flower gardens. Some seasons their injuries are very serious, the growth of many flowering plants being stunted or completely destroyed. There are a great many different kinds of plant lice, or aphids, in Canada, but most of these have in general the same feeding habits. They are all sucking insects and live solely on the juices which they extract from their host plant. Some kinds feed on the under side of the foliage, others cluster on the stems of plants, and others again are found attacking the roots. Those which feed on the foliage often cause the leaves to curl and become conspicuously distorted.

One species in particular about which much enquiry is made in Ontario, is the Snowball Plant-louse. Large clusters of these insects are found on the under surface of the leaves, which soon become drawn up, giving a very unsightly appearance to this beautiful and popular bush.

When plant lice are first noticed the plants should be sprayed with kerosene emulsion, or whale oil soap. The dark kinds are the more difficult to kill, and the solution used will have to be stronger. Whale oil soap, one pound in four gallons of water, will be necessary. During the past year some new methods of making kerosene emulsion have been devised by Mr. F. T. Shutt, Chemist at the Central Experimental Farm, Ottawa. One of these emulsions is worthy of notice here and is particularly applicable for immediate use in gardens and over small areas. This is made by mixing two ounces of flour in a little scalding water, afterwards adding one quart of kerosene, and then two gallons of water, stirring the whole thoroughly for a few minutes.

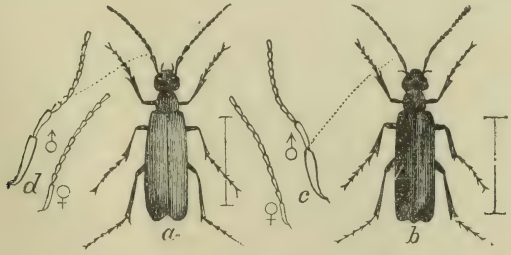


Fig. 43. Blister-beetles.

Blister Beetles, *Epicauta pennsylvanica*, De G., (Fig. 43), *Epicauta vittata*, Fab., (Fig. 44), and *Macrobasis unicolor*, Kirby. These active, soft-bodied, beetles, from their habit of suddenly appearing in large numbers, often do much damage in gardens before their presence is detected. They

have a great variety of food plants, among which are the various kinds of China and German asters, dahlias, and some other Compositæ. As a rule Blister Beetles only do damage in years following excessive locust outbreaks. In their larval state, as is well known, they are predaceous parasites on the eggs of grasshoppers, and therefore when the beetles appear in numbers it is undesirable to destroy them if this can be avoided. Although the attack is generally severe while it lasts, the period during which Blister Beetles injure vegetation is not of long duration, and, besides this, they do not occur injuriously every year. Like other leaf-eating insects, however, these beetles can be destroyed by spraying the plants with a Paris green, or other arsenical, mixture. In small gardens a simpler remedy is to beat them into a pan, or other shallow vessel, containing water with a little coal oil on the top.

Fig. 44. Striped Blister-beetle.

Fig. 45. Flea-beetle. (Much enlarged.)

Fig. 46. Rose beetle.

Flea-Beetles. (Fig. 45.) The foliage of some kinds of garden plants is often partly, or wholly, devoured by small active beetles, which leap like fleas, owing to which habit they are known by the name of flea-beetles. There are a number of different species in Canada, two of which specially are responsible for much damage. In early spring at Ottawa, the white flowers of the favorite border and rockery plant, Alpine Rock Cress, *Arabis alpina*, L., are nearly every year injured, some seasons very seriously, by *Phyllotreta vittata*, Fab., which, on account of its great destructiveness to the leaves of turnips, is called the Turnip Flea-beetle. The perfect beetles are about one-eighth of an inch long and in color are black, shining, with yellowish marks on the wings. On several occasions the Red-headed Flea-beetle, *Systena frontalis*, Fab., has been the cause of much injury in the Botanic Garden of the Central Experimental Farm. (Report Entomologist and Botanist, Dom. Exp. Farms, 1889.) Young plants and low shrubs of a great many orders were attacked, their ravages being particularly to some species of *Althæa*, *Hibiscus* and *Weigelia*. Injury was all done by the perfect beetles, few plants appearing to come amiss to them. This flea-beetle is about one-fourth of an inch long and has a black head with a red patch on the top of the head in front. In August last the beetles were very abundant at Ottawa, particularly on the second crop of clover. Another flea-beetle which has not yet been identified is occasionally destructive at Ottawa to Forget-me-nots. Paris green and land plaster, or flour, in the proportion of one pound of the former to twenty of the dry diluent, dusted on infested plants, if possible when they are covered with dew, is one of the best remedies against these troublesome insects. The ordinary poisoned Bordeaux mixture is particularly effective against flea-beetles when applied as a spray, and indeed has been found to be by far the best remedy for controlling the Potato Flea-beetle, *Epitrix cucumeris*, Harr.

The Rose Beetle, *Macrodactylus subspinosus*, Fab. (Fig. 46.) This common enemy of the fruit-grower, known also as the "Rose-chafer" and 'Rose-bug," which every year does so much harm in vineyards and orchards,

is often very destructive to the flowers of rose bushes, as well as to the bloom of many other kinds of flowering plants. In Ontario this insect has been particularly abundant in the Niagara district. The mature beetles last for about five weeks and when present in large numbers are very difficult to get rid of. It has been found, however, by Prof. F. M. Webster that 95 per cent. of the adult beetles may be killed by spraying them with half a pound of fish-oil soap in a gallon of water. The suds must be thrown directly onto the beetles while they are clustered on the flowers. This remedy of course is only useful in killing the beetles on the plants; it has no effect in keeping them off afterwards. These beetles, although very active during the hot hours of the day, are sluggish early in the morning, and at this time may be easily beaten from the plants into an inverted umbrella and then emptied into some vessel containing water with coal oil on the surface. Rose bushes may be protected by covering them with netting.

The American Rose-Slug, *Endelomyia* (*Selandria*) *rosæ*, Harr. Occurring commonly in Ontario, and doing considerable damage every year to the foliage of roses, is a slug-like larva about one-third of an inch long, green in colour, swollen near the head, but not slimy as is the case with many other allied saw-fly larvæ. This false caterpillar is nocturnal in habit, and feeds on the upper side of a leaf, but during the day, when at rest, may be found concealed on the under-surface of the leaf. Infested plants will soon show the presence of these slug-like larvæ from the foliage becoming conspicuously skeletonized. These rose slugs may be easily destroyed by dusting the plants with white hellebore, or spraying them with a mixture of two ounces of hellebore to every two gallons of water. A weak solution of Paris green, one ounce in fifteen gallons of water, is also very effective.

The Bristly Rose-Worm, *Cladius pectinicornis*, Fourcr. Another saw-fly larva which is abundant in Ontario, and which, at Ottawa, is the commonest of the three rose saw-flies mentioned in this article, is the Bristly Rose-worm. This larva, when full grown, is about two-thirds of an inch long, and ranges in colour from dirty yellowish-green to a glaucous-green, with a darker green line down the back. This false caterpillar is covered with stiff hairs, which give it a conspicuous bristly appearance. The larva, when young, works very much in the same way as the Rose-slug, skeletonizing the leaves, and leaving whitish blotches. As it grows older, however, it eats out irregular holes all over the leaf, often consuming the whole substance, except the stronger ribs. The same remedies used for the Rose-slug are applicable for this insect.

The Curled Rose-Worm, *Emphytus cinctipes*, Nort. This rose-worm is also common all through Ontario wherever roses are grown, and, like the two preceding species, is an important enemy of that plant. The larva is easily distinguished from either of the other two kinds mentioned above, being smooth, and in having a yellowish brown head marked with a broad brownish-black spot. The body is dark green above, with the sides and legs grayish-white. This larva eats the entire substance of the leaf, feeding along the edges, with the body curled beneath it. When at rest it remains curled up on the under-surface of the leaf. Hellebore, or a weak solution of Paris green, is also recommended for the Curled Rose-worm.

The Small White Cabbage Butterfly, *Pontia rapae*, L. (Fig. 48). This pest of the market gardener, which now occurs right through Canada, not infrequently requires attention in flower gardens, from its ravages to stocks and other crucifers, mignonettes, nasturtiums and spider flower (*Cleome*). These velvety green caterpillars about an inch in length, with a

broken yellow line along each side and an unbroken one down the middle of the back (Fig. 47), are particularly destructive to mignonettes, some seasons it being almost impossible to grow good plants. The insect is, however, an easy one to control. The dusting of infested plants with pyrethrum insect powder is about the best remedy for the caterpillars of this common butterfly. This preparation can be made by mixing thoroughly one part of weight of the insect powder with four parts of cheap flour, keeping the whole in a closed vessel for at least 24 hours. The mixture can then be distributed easily by placing it in a small bag of fine muslin which can be tied to the end of a short stick so that it swings freely. If the bag is tapped lightly with another stick held in the other hand, many plants can be gone over quickly and without tiring the operator. Many florists and seedsmen now sell proper bellows or dusters for applying dry powders, and these are not very expensive.

Fig. 47. Pontia rapæ : *a*, caterpillar ; *b*, chrysalis.

Fig. 48. White Cabbage butterfly.

The Diamond-Back Moth, (*Plutella maculipennis*, Curtis, *Plutella cruciferarum*, Zell. (See Fig. 33.) This well-known enemy of the market gardener, during some seasons does serious harm to wall-flowers, stocks, and other crucifers. The caterpillar which is from one quarter to three-eighths of an inch in length is green and very active. It is particularly abundant during July and August, but fortunately occurs irregularly, being doubtless held in check by parasites. These small caterpillars when disturbed run backwards, wriggling their bodies from side to side, and when they reach the edge of a leaf, they let themselves down by means of a silken thread. In garden practice infested plants may be sprayed with kerosene emulsion, or a soap mixture, to which Paris green or some other active poison has been added, the spray to be forced well up under the leaves if possible.

The Zebra Caterpillar, *Mamestra picta*, Harr. (See Fig. 2.) This common enemy of turnips, cabbages, clover, etc. is sometimes troublesome in flower gardens. In his 1896 annual report, Dr. Fletcher spoke of a serious infestation at Ottawa, the plants attacked in gardens being sweet peas, lilies, gladioli; in fact it was stated that the larvæ attacked indiscriminately almost all the annuals. On Oct. 3rd of the present year, the writer noticed the species feeding on asters. The caterpillar is a handsome one, about two inches long when full grown, velvety black on the back and having two golden yellow stripes on each side of the body, which are connected by narrow lines of the same colour, the head and feet bright reddish brown. When young the larvæ for a time feed together, but as they grow larger they separate and feed singly. There are two broods of the insect in the year, the second one of which occurs in September, and is the most troublesome. A remedy for these caterpillars is to spray infested plants with Paris green, one ounce in

10 gallons of water. Dusting the plants with pyrethrum insect powder is also useful. If only a few specimens are found in a garden, they can of course be removed by hand and destroyed.

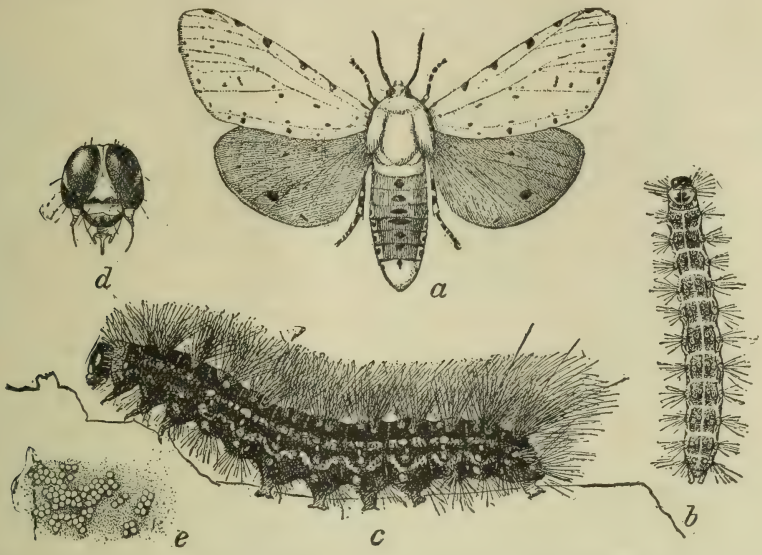


Fig. 49. Salt-marsh caterpillar and moth. (Chittenden, Bull. 43, Div. of Ent., U.S. Dep. Agr.)

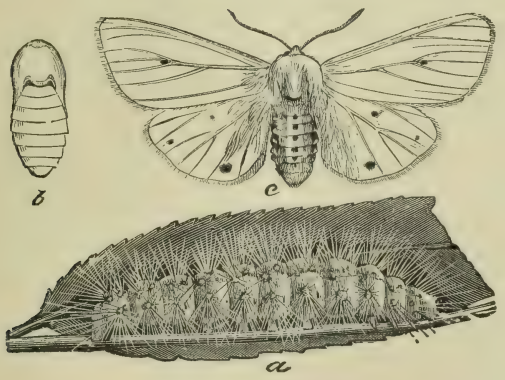


Fig. 50. The Yellow Woolly-Bear: *a*, caterpillar; *b*, chrysalis; *c*, moth.

Woolly-Bears. The caterpillars, or "woolly-bears," of two kinds of arctian moths, commonly occur in gardens, occasionally in sufficient numbers to demand attention. These are the Salt-Marsh Caterpillar, *Estigmene acræa*, Dru., (Fig. 49) and the Yellow Woolly-Bear, *Diacrisia virginica*, Fab. (Fig. 50.) Both of these caterpillars are, in general, of similar appearance and habits, and feed on a great variety of plants. The former kind is the larger, measuring when full grown about 2½ inches in length, and it differs from the Yellow Woolly-Bear in having a darker body and yellow markings along the sides. These caterpillars, as the name "woolly-bear" indicates, are quite hairy, the hairs of the former being mostly always reddish, or reddish brown, while those of the latter vary considerably, the hairs in some specimens being whitish, or pale yellow, while those in others are reddish, or reddish brown. Injury by these caterpillars is most noticed when they

are in their younger stages during which time they feed together, but as they grow older and reach maturity they separate and wander off by themselves. Hand picking answers as a remedy in most cases, but if the attack should be serious, spraying with Paris green, or any other of the well known arsenical poisons, would soon destroy the larvæ.

The Oyster Shell Scale, *Lepidosaphes ulmi*, L. (Fig. 51). Occurring commonly in some districts in Ontario on rose bushes of many kinds are the oyster-shell shaped scales, which are so well known from injuries by the insects to fruit trees, particularly the apple. Unlike many other kinds of scale insects, the Oyster-shell Bark-louse has only one annual brood, the insect passing the winter in the egg state under the mother scales, and the young larvæ appearing in spring. If rose bushes are found to be heavily infested with this scale insect, they should be sprayed in late fall or early winter with a whitewash mixture, using one pound of unslaked lime to every gallon of water. A second spraying should be applied as soon as the first one is dry. The lime hardens on the bark and flakes off during the winter, taking with it the scales with the clusters of eggs. In June when the young lice hatch they may be easily seen running about on the bark preparatory to settling down. When detected the bushes should be sprayed with kerosene emulsion. A simple formula for making this for immediate use in gardens will be found under the paragraph treating of Plant Lice.

The Rose Scale, *Diaspis rosæ*, Bouche. An unpleasant sight in rose gardens are clusters of roundish white scales which show up conspicuously in contrast to the greenish or reddish shoots of the rose bushes. This scale insect is sometimes very common on neglected bushes, and if not attended to will soon do serious damage. Being a sucking insect kerosene emulsion or whale oil soap are the best remedies. It has only so far occurred in the Province of Ontario around Lake Ontario, its worst attacks being on raspberries.

The Rose Leaf-Hopper, *Typhlocyba rosæ*, L. This common leaf-hopper, which occurs all through the country, wherever roses are grown, is often seen in swarms on the leaves of these bushes. These insects are very small, pale greenish-white, and are often spoken of by the confusing name of "Rose Thrip." Throughout the summer they may be found on the leaves in various stages of development, and are frequently extremely destructive. They can be controlled, however, by spraying the bushes with kerosene emulsion or whale oil soap.

The Grape Vine Leaf-Hopper, *Typhlocyba comes*, Say, *T. vitis*, Harr, etc. An insect which demands much attention every year in Ontario is the Grape Vine Leaf-hopper. Although very destructive to the foliage of grapes, lovers of ornamental plants are often exercised over a small hopping insect which occurs in countless numbers on Virginian Creepers. These insects, also as in the case of the Rose Leaf-hopper, are erroneously spoken of as "Thrip." They are of a translucent white colour prettily marked with red and dark brown lines. In their younger stages they are pale and although lacking wings are almost as active as the full grown insects. These leaf-hoppers pass the winter in the perfect state hidden away amongst fallen leaves and other rubbish. The ground, therefore, should be raked and kept clean during autumn so as to reduce as much as possible the opportunities of these insects wintering near the vines. In all their stages these leaf-hoppers live by suction and therefore can be killed by contact insecticides. Kerosene emulsion and whale oil soap are the best mixtures to use, and the

spraying should be done before the insects develop their wings. When these insects are present on a vine the leaves soon become white in patches and then fall to the ground.

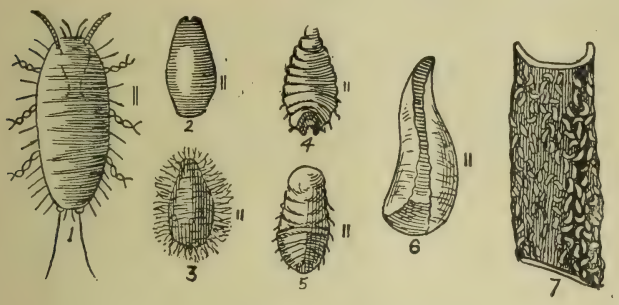


Fig. 51. The Oyster-shell Scale.

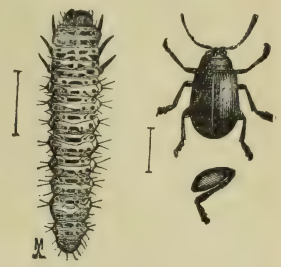


Fig. 52. Grape-vine flea-beetle and larva, much enlarged; also leg, greatly magnified.

Fig. 53. Grape-vine Flea-beetle, showing beetles and larvæ at work.

The Grape Vine Flea-Beetle, *Haltica chalybea*, Ill. (Figs. 52 and 53). This is another well known grape insect, but one which often does much injury in Ontario to the foliage of Virginian creepers. When the dirty, yellowish-brown grubs, which have black shining bristle-bearing tubercles are found on the vines, they may be destroyed by a Paris green spray 1 oz. in 10 gallons of water. All fallen leaves and rubbish should be burned in autumn to prevent the mature beetles from hibernating near the vines.

The Violet Sawfly, *Emphytus canadensis*, Kirby. Pansies and violets, which are always favourites in gardens, are sometimes seriously attacked by the false caterpillars of this sawfly. These larvæ which are smooth and bluish-black in colour are about ½ an inch in length when mature. When in their younger stages they have the habit of eating little holes in the leaves, but as they reach maturity they feed mostly along the edge of a leaf. These false caterpillars when at all numerous do a great deal of harm, oftentimes completely defoliating plants. At Ottawa the species is of common occurrence, some seasons doing considerable damage. Last June and the first half of July the larvæ were very abundant on violets on the grounds of the Central Experimental Farm. In Canada, Dr. Fletcher tells me injuries by the Violet Sawfly, have not been reported from very many localities. In 1898 considerable injury was done in large beds of violets grown under glass in Toronto. As the larvæ feed as a rule during the night, Dr. Fletcher recom-

mends as a remedy, the dusting of the plants in the evening with white hellebore, or with Paris green mixed with 50 times its weight of common flour, or some other dry diluent.

The Oblique-banded Leaf-roller, *Archips rosaceana*, Harr. (Fig. 54). This widely distributed leaf-roller, the caterpillar of one of the tortricine moths, is very common in Ontario and has a great range of food plants. At Ottawa the larvæ have been particularly abundant on apple, and in flower gardens we have found the species on roses, climbing honeysuckles, geraniums, spiraeas, and many other plants. The caterpillar besides rolling up the leaves very often has the habit of tying together the upper leaves and buds of flowering plants and then destroying the flowers. When full grown it is about three-quarters of an inch in length, green, with a darker green dorsal vessel; the head black in front, brownish at the top, as is also the top of the first body segment; the feet all black. This leaf-roller, although common and widespread, has never occurred in gardens in Ontario to require much attention. Handpicking as a rule will serve as a remedy, but if the caterpillars should appear in numbers spraying with some poison would soon destroy them.

Fig. 54. Oblique-banded Leaf-roller moth.

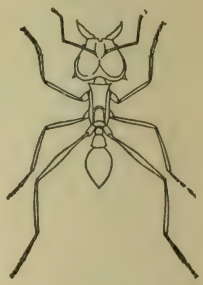


Fig. 55. Ants.

Ants (Fig. 55). Enquiries are frequently made for information concerning ants which infest garden plants of many kinds. It is generally believed that these insects do harm to plants, but this is not the case. In most instances, if close observation is made, it will be found that plant lice are present and are the real cause of the injury. The relations of ants to plant lice are very interesting. It is well known that ants are protectors of plant lice; they are very fond of the sweet honey dew which is emitted by them, and certain kinds even actually colonize them on plants near or inside their nests. Some ants indirectly, therefore, are very injurious, although they do not themselves feed upon plant tissue. When they are seen to be running about on plants, a search should be made for their nest which will, in all probability, be located in the earth close by. When this is found a tablespoonful of bisulphide of carbon should be poured into it and the opening immediately closed up by stepping on it. The fumes from this liquid will penetrate quickly into all parts of the nest, and not only kill the adults but the larvæ as well. This material is very inflammable and care must be taken not to bring a light near it. Another remedy is to pour scalding water into the nests.

Red Spider. Although chiefly a greenhouse pest, these minute mites are often found doing considerable damage to the foliage of plants in flower gardens, particularly during hot, dry seasons. The presence of these small creatures on the plants is easily detected by the leaves losing their colour, having a white, bleached appearance, and becoming stunted. These mites live by sucking out the juices from the leaves and in this way

slowly reduce the vitality of the plants until in many instances they are completely killed. They do not seem to have a preference for any particular kind of plant, but possibly are more noticed, at least in this locality, on verbenas and roses. Some years when they are very bad it is almost impossible to grow verbenas. Probably the best remedy for these mites is to spray the plants with flowers of sulphur in the proportion of one ounce to every gallon of water. As these mites feed chiefly on the under side of leaves, the spray should be forced up among the foliage as much as possible. If only a few plants are found to be infested with red spider, the sulphur may be dusted on to the leaves by means of a small bellows, or other specially made implement, which is now used for such purposes, and sold by many seedsmen.

Snails and Slugs. These slimy, soft-bodied mollusks which, of course, are not insects, are included in this article, because the entomologist is often asked for information concerning them and particularly for a remedy for their destruction. Every year they are very injurious in flower gardens, and as they come out to feed in the evening an excellent remedy is to broadcast lightly over the soil, before nightfall, freshly slaked lime. This adheres to their bodies and soon kills them. Two or three applications on consecutive evenings will eradicate them thoroughly.

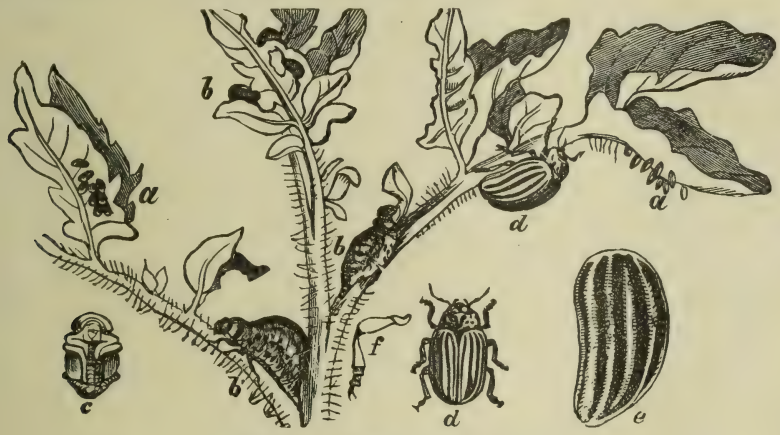


Fig. 56. Colorado Potato-beetle.

PESTS OF LESSER IMPORTANCE.

The Colorado Potato Beetle, *Leptinotarsa decemlineata*, Say. (Fig. 56). In the fall of the year, when there are few potato tops left in the fields, these beetles on account of the scarcity of food, wander about in search of something to eat, and often attack plants of the tobacco family as *Nicotiana affinis* and the newly introduced *N. Sanderœ*, both of which are favorites in flower beds because of their large foliage and showy flowers. The former is deliciously scented at night. These beetles swarm on to such plants in September and unless attended to at once quickly destroy the foliage and flowers. As soon as they are noticed the plants should be dusted with Paris green mixed with 50 times its weight of common flour, or some other dry diluent. If more convenient the plants may be sprayed with Paris green, using one ounce in every ten gallons of water.

The Milkweed Doryphora, *Labioderma clivicollis*, Kirby. In Eastern Ontario this bettle is very abundant on the common milkweed, *Asclepias cornuti*. Owing to its beauty, the Pleurisy-root, *Asclepias tuberosa*, is

grown in some of the beds on the Central Experimental Farm, but every year the plants are attacked by this insect. Some seasons the species is very abundant and does a lot of injury. It is most prevalent during the month of August, and the injury is mostly done by the mature beetles. The insect although it is so abundant at Ottawa is, I believe, uncommon in western Ontario.

Homohadena badistriga, Grt. For some years the larvæ of this noctuid moth have been present, in more or less numbers, on several kinds of climbing honeysuckles, (*Lonicera* species) on the Central Experimental Farm. During certain seasons their injuries have been quite apparent. In May, 1901, the larvæ were abundant on many of the yellow-flowered varieties, which they seem to prefer. At this time caterpillars in all stages were found. Very young larvæ, about a quarter of an inch long, were collected, but no trace of eggs or empty shells could be seen. Every year since 1901 we have looked in vain for eggs, although we have found young larvæ which could not have been out of the egg more than a day or two. The young larvæ feed on the buds and foliage of the new shoots of the plant, hiding in the day time inside the two clasping leaves, which surround the cluster of flower buds at the tip. As they mature they crawl down to the shady side of the old wood of the plant upon which they rest when not feeding. When in the last stage the ground colour of the caterpillar is remarkably like that of the stem, or twig, upon which it rests.

The Iris Borer, *Macronoctua onusta*, Grt. In the 1903 report of this Society, the writer reported the occurrence, in destructive numbers, of the larvæ of this noctuid moth, which is rare in collections, and gave notes on them and on the pupæ. During the past season the species was again observed in some of the Iris beds on the Central Experimental Farm, but not in destructive numbers. Full grown larvæ were found on July 21. Nothing new was noted with regard to their habits.

The Columbine Borer, *Papaipema purpurifascia*, G. & R. Mention of an infestation by this insect at Ottawa in 1904, was made by the writer in our last annual report. During the past season this borer was again very destructive at Ottawa to cultivated Aquilegias. On June 29 they were very abundant, boring into the stems. At that date they were 7-8 of an inch in length and only a few had entered the roots. On July 13 as many as 13 larvæ were found in one columbine plant, and every plant in a large bed seemed to be seriously infested. It was interesting to note this year, however, that many of the larvæ were parasitized by a *Tachina*, possibly one-third of the larvæ collected.

The Burdock Borer, *Papaipema cataphracta*, Grt. This is another noctuid borer, but one which, while abundant almost every season at Ottawa, seems to be of rather uncommon occurrence in other parts of Ontario. Unlike the two mentioned above, this larva seems not to mind adapting itself to any plant with a succulent stem, and so has been found infesting a variety of different plants. At Ottawa, the favourite food plant is burdock, and two or three larvæ are often found in the same plant. During the past season the caterpillars were quite abundant at Ottawa, and in about an hour's time, on July 27, Dr. Fletcher and I collected nearly fifty specimens. These with the exception of two were all found in burdock. Other plants in which we have found this borer are Canada Thistle, dahlias, lilies, sunflowers, tomatoes, potatoes and rhubarb.

Unfortunately, owing to the boring habits of these larvæ, there is no remedy for them other than cutting off the portion of the plant containing the caterpillar and destroying the latter. It is seldom, however, that these

insects are sufficiently abundant to be destructive enough to cultivated plants to cause alarm. As a rule it is only a very small number of plants which are attacked. The presence of these borers in gardens can usually be detected by the unhealthy appearance of the plants, the tops in most instances having become withered and fallen down to one side.

THE SPIRÆA LEAF-TYER, *Olethreutes hemidesma*, Zell. In 1901 the leaves of several of the Spiræas in the Arboretum of the Central Experimental Farm, were drawn together at the tips of the plants by beautiful little larvæ about half an inch in length. Specimens of these were collected on June 18 and moths reared, the first one emerging on July 3. These caterpillars were fairly abundant on a few bushes and their feeding places could easily be detected at the tips of the branches. The caterpillar is very dark velvety green, with conspicuous rows of white tubercles on the body, each of which bears a long slender hair. The head is tawny, with a distinct black band on the posterior margin of cheek; ocelli and antennae black. Thoracic shield concolorous with head centrally, but black on most of the lower third. Thoracic feet black. Specimens of the moths were kindly identified by Mr. W. D. Kearfott.

THE ASTER SHARK, *Cucullia convexipennis*, G. & R. At Ottawa the larvæ of this noctuid moth are some years fairly abundant feeding chiefly on the the flowers of China asters. They have never been abundant enough to do very serious injury, as a rule not more than one or two specimens being found on the same plant. Full grown specimens have been found during the latter part of August and in September. The caterpillar is a rather striking one when mature, measuring over an inch and a half in length, with a wide reddish band down the centre of the back, on either side of which are four or five dark brown irregular lines, the colour between being white. The sides are white with transverse bands of brown. Just above the feet is a bright, wide band of red. On the under side are some more irregular lines. The head and front feet are shiny black, the hind feet being dark brown. When present on a plant the larvæ are generally seen lying among the florets, and as a rule are quite conspicuous, although sometimes they are rather difficult to detect on account of their colours resembling those of the flowers. Occasionally we have seen specimens resting on the stems of the plants.

THE MINT SPHINX, *Sphinx eremitus*, Hbn. On several occasions we have found, at Ottawa, the full grown caterpillar of this beautiful hawk-moth, feeding in flower gardens on Monarda and mint. The species is not at all common in Ontario, and collected specimens are always considered good finds. Two dates on which we have found the larvæ are 25th August and 20th September.

THE BORDERED SALLOW, *Pyrrhia umbra*, Hufn. The young larvæ, green spotted with black, of this noctuid have the habit of eating into the buds of *Delphinium*, *Aquilegia* and many other garden flowers. The larvæ are also frequently found late in the year on many low plants, particularly on different species of *Polygonum*. There are two distinct forms of this larva, one being green spotted with black tubercles and having conspicuous dark longitudinal stripes, the other milk-white with a cross-shaped orange blotch in the centre of each segment on dorsum. This latter form also has markings along the body but these are indistinct.

THE BRONZE COPPER, *Chrysophanus thoe*, Bdv. (Fig. 57.) In the Botanic Garden at the Experimental Farm, plants of the genus *Polygonum*, are almost every season, more or less, attacked by the caterpillars of the above butterfly. These infestations are never very serious, but on one or two

occasions the larvæ were rather abundant and noticeable injury to the foliage was done. It is not likely, however, that these caterpillars will ever become sufficiently numerous to require attention. Some of the cultivated Polygonums are familiar in flower gardens and if this insect should be found doing serious injury, Paris green applied to the foliage either in a spray, or a dry diluent, would soon destroy any caterpillars present. Injury to the foliage of such conspicuous plants as these is easily recognized, and further damage can be prevented if prompt action is taken. The ordinary wild food plants are various species of Rumex.

Fig. 57. Chrysophanus thoe ; male and female butterflies.

The Sunflower "Peacock Fly," *Straussia longipennis*, Weid. Stems of the common sunflower, *Helianthus annuus*, L., at Ottawa are invariably infested by the maggots of this fly. These insects, or "peacock flies" so-called, because of their habit of elevating the wings and strutting about peacock-like, are very beautiful, the wings of many of the species being prettily marked and spotted with black or brown. At Ottawa the above species has been so abundant some seasons that it has been impossible to find a sunflower plant of which the pith had not been almost entirely devoured. Plants, however, the pith of which had been tunnelled from the base to the very flowers grew remarkably well and kept green and vigorous up to the first frosts. This insect, therefore, does not appear to injure the sunflower to any practical extent. The flies may be found in early summer.

Injury to Pinks and Carnations by an Anthomyian. Occasionally in flower gardens in different parts of Canada, various kinds of pinks and carnations have been injured by Anthomyian larvæ. In Dr. Fletcher's report for 1885 it is stated that injury at Victoria, B. C. was first noticed about the middle of May. Referring to this attack Dr. Fletcher says: "The egg appears to be laid at or near the base of the topmost leaves. The young maggot burrows beneath the epidermis of the base of the leaves for some time and then bores down the centre of the stem." Specimens of this Anthomyian were bred at Victoria by Mr. J. J. Cowley. The maggots left the plants about 1st June and went into the ground to pupate. The flies appeared about 10 days later. During the same year Dr. Fletcher found a specimen at Ottawa which was destroying Indian Pinks in exactly the same manner as those in Mr. Cowley's garden. This specimen produced a fly which Dr. Fletcher says, was apparently identical with those bred at Victoria by Mr. Cowley. Since then the species has been found to be rather destructive to the shoots of the pretty perennial *Gypsophila paniculata*, which also belongs to the Pink family.

The Variegated Fritillary, *Euptoieta claudia*, Cramer, (Fig. 9.) In July last an enquiry was received at the Division, concerning a caterpillar which was destroying pansies at Baltimore, Ont. The correspondent, Mr. T. M. Wood, writing to Dr. Fletcher, July 18 said: "I send herewith two caterpillars which I found on a row of pansies. About a week ago there

were dozens of them but to-day I got but five, which I put in a box with a pansy plant. I see to-night they are changing to the pupa state." The specimens arrived at Ottawa on July 20 and proved to be *Euptoieta claudia*, Cramer. The occurrence of the species in numbers, at Baltimore, Ont., is very interesting, as the insect is rare in Ontario, only a few previous records of the butterfly having been recorded by collectors. In the North-west the butterfly is much more abundant, and was found, by Dr. Fletcher, very destructive to pansy beds at Kinistino, N. W. T. Dr. Fletcher tells me he has seen the females ovipositing on the wild flax, *Linum sulcatum*.

Sparganothis (*Œnectra*) *flavibasana*, Fern. In June, 1895, this species was found in some numbers by Mr. J. A. Balkwill, at London, Ont., and specimens of the moth were identified, through our late Curator, Mr. J. Alston Moffat, by Prof. C. H. Fernald. Mr. Balkwill found his first specimens at rest upon honey-suckle in his garden, but later found some pupæ which produced the moths. In the *Canadian Entomologist*, October, 1895, Mr. Moffat says: "Presumably the larvæ had fed upon the honeysuckle, as chrysalids were found in the connate leaves with a thin silken web spun over them, one of which I raised to the moth. There is plenty of evidence of feeding having been done upon the plant, but nothing positive as to what did it. A lookout is being kept upon the plants for the next brood." Under date of November 17, 1905, Mr. Balkwill writes: "Your letter of the 15th inst. is to hand. I am sorry that I am unable to give you the information desired. I captured the moths on honeysuckle and found some of their cocoons, which were reared to mature insects. We could not find the larvæ although Mr. Rennie and I kept a good look out for the next two years."

The Greenhouse Leaf-Tyer, *Phlyctænia rubigalis*, Gn. = *Phlyctænia ferrugalis*, Hbn. In Canada this insect has never been reported as doing any injury to plants other than those grown under glass. In the United States, however, the caterpillars are known to feed on several kinds of crop plants, as celery, cabbage, beets and tobacco, as well as on a great many ornamental plants grown outside, such as wall-flowers, dahlias, daisies, begonias, roses, nasturtiums, geraniums, carnations, etc. The insect is abundant in some of the large greenhouses in central and western Ontario and mention has been made of injuries by the larvæ in Toronto, in the annual reports of the Dominion Entomologist for 1899 and 1900. Since that date Dr. Fletcher and the writer have published the life-history of the species in the May, 1901, number of the *Canadian Entomologist*. When full grown the caterpillar is about three-quarters of an inch in length, of a semi-translucent green colour, with two distinct black spots (one on each side) close behind the head, and a green dorsal vessel showing distinctly down the middle of the back, bordered on each side with a double white band. As its popular name would suggest the caterpillar has the habit of drawing together portions of a leaf, or of two leaves that happen to be contiguous, and tying them with fine threads of silk. This webbing of the leaves is more apparent, of course, as the larva reaches maturity and owing to its manner of protecting itself it is rather difficult to reach with a spraying mixture. A Paris green or some other arsenical mixture would doubtless prove to be a remedy, should the caterpillars be noticed working on any plants in flower gardens, or many of them could be removed by handpicking.

Rose Root-Gall, *Rhodites radicum*, O. S. (Fig. 58.) This large gall which is from 1½ to 2 inches in diameter is not infrequently found in Ontario on and at the roots of many kinds of wild roses, as well as sometimes on cultivated ones. The insect which causes this conspicuous gall is a four-winged

fly, with a short round reddish body, belonging to the hymenoptera. At Ottawa we have found these galls irregular, smooth and potato-like rather oftener than elongated as shown in the figure. The only suggestion in the way of a remedy is to cut out the infested portions of the plants.

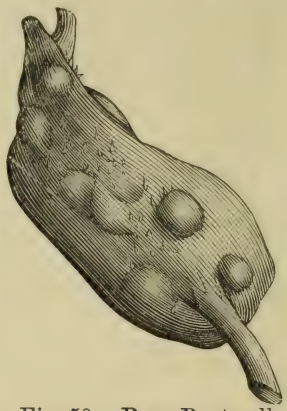


Fig. 58. Rose Root-gall.

Tortrix albicomana, Clem. The small caterpillars of this well known little Tortrix moth were very abundant and destructive to the leaves of Japanese Rose at Ottawa during the past summer. They were particularly abundant about the middle of June and moths were flying in large numbers around the bushes on July 8, on which date Dr. Fletcher collected many specimens.

Archips purpurana, Clem. Several specimens of the larva of this common, rather small, moth, were found at Ottawa by Dr. Fletcher during the past season in his cultivated beds of wild violets. No serious injury was done to the plants and the specimens when discovered were removed by hand.

The Hoary Plume, *Pterophorus monodactylus*, L. During the past season at Ottawa the small green caterpillars, much the same colour as the leaves of their food plant, of this plume moth were found to be very destructive to the Minor Convolvulus. These larvæ which were most abundant in September were found to be eating the flower buds and leaves at the tips, entirely preventing the plants from developing any flowers. Associated also with this species was the tineid *Bedellia somnulentella*, Zell, which helped to some extent in the injury.

Leaf Miner in Leaves of Lonicera. During some seasons at Ottawa the leaves of one of the honeysuckles, *Lonicera fulgens*, have been mined by a small lepidopterous larva, which in 1901 we reared to the perfect state, and which has been identified by Mr. August Busck of the U. S. Bureau of Entomology, as *Lithocolletes fragilella*, F. & B. The larva makes a conspicuous blotch-like mine in the leaves, and on some foliage examined there were two or three mines in the same leaf. In 1901 the larvæ were first noticed about July 20 and by August 5 had pupated.

FOREST ENTOMOLOGY.

By E. J. Zavitz, Ontario Agricultural College, Guelph.

Destruction of the forest by insects is a problem in which the forester is very much interested. The depredations of these small foes are being carried on to a greater extent than we realize, and every season sees large quantities of timber being injured or destroyed by insects.

Entomology is of vast importance to the forester, and he should at least become acquainted with the appearance and life history of the important forest insects. In universities and forest academies in Germany where forestry is taught, special courses are given in Forest Entomology. The German forester carries in his pocket a small calendar in which he takes notes and in which is recorded what to look for during each month of the year. It is interesting to note that one of the subjects, taking greatest space, is that regarding the insects for which to be on the lookout during each month.

Insects damage forests in many ways and at various stages. The fruit, the tender seedling, and the roots, foliage and wood of the mature tree all have their enemies. In fact, during its whole life history the tree is subject to attacks.

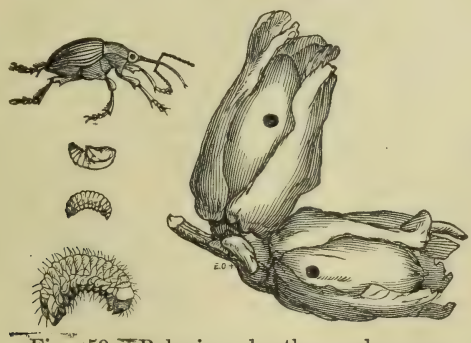


Fig. 59.—Balaninus beetle, grub, pupa and infested nuts.

In collecting the acorns of Red Oak for seed I have found that a large percentage of the acorns are destroyed by one of the Curculionidæ. Two bags of acorns, which had been allowed to stand over night, were surrounded by footless grubs one centimetre in length. These are probably the larvæ of *Balaninus quercus*. It was estimated that about forty per cent. of these acorns were destroyed by this insect. The female insect bores a hole into the acorn and then drops in the egg which develops into the grub-like larva. This larva feeds upon and in most cases destroys the acorn. After the acorn falls to the ground in autumn the larvæ go into the soil and transform, coming forth the following spring. (Fig. 59 represents a closely allied species which attacks Filberts).

This shows that this insect alone is a strong factor against the reproduction of red oak under natural conditions. Curculios also infest the seed of such trees as basswood, hickory and chestnut.

During the seedling stages of the tree the insects carry on their work. The cutworm has given some trouble in cutting the white pine seedlings in the nursery beds. A number of small white ash were found to be dying, and upon examination it was found that the roots were attacked by the wireworm or larvæ of the click-beetle. The larvæ were hardly discernible at first

as they had gone into, and were working in, the centre of the root. Damage was also done to the roots of some seedlings by the Lachnosterna larvæ. (See Fig. 6.) I regret that I am unable to identify the above species. However, I expect they will give me sufficient opportunity to further study them. The foliage of forest trees suffers from the work of a great variety of insects. This injury is not only unsightly but from the forester's standpoint hinders the proper development of the stem of the tree. Defoliation cuts off the food supply and so lessens the amount of wood laid on during the season. Considerable damage is annually being done by Lepidopterous larvæ. Owing to the fact that their life history is more easily followed than that of other orders there is considerable known and written concerning their work.

Fig. 60. Larch Saw fly ; *a*, with outspread wings ; *b*, the brown pupa case—both greatly enlarged ; *c*, terminal twig of Larch showing eggs in slits made by the female saw fly.

The Larch Saw-fly, (Fig. 60), a hymenopterous leaf destroyer, has done an enormous amount of damage in Canada. The tamarac has suffered from this insect throughout its known area of distribution and as yet its natural enemies have not controlled it. In the vicinity of Guelph this insect has done considerable damage to the European larch and our native tamarac during the last season.

Coleoptera, in both the larval and adult form, are responsible for damage done to the foliage. The Lamellicorns and Chrysomelids both feed upon the leaf in the adult form. Lachnosterna frequently does damage to the maple and other leaves, but not to any serious extent. The basswood or linden leaf seems to suffer most from their attacks and late in the summer it is almost impossible to find a perfect leaf. Large numbers of *Macrodactylus subspinosus* (Fig. 30) and *Odontota rubra* have been taken from this tree in beating operations and probably they are responsible for a great share of the damage done. Of the Coleoptera the Chrysomelids in the larval and adult stages do most damage to the leaves of forest trees.

Roots are attacked by the larvæ of Prionids and Lamellicorns. Buds have enemies in the Curculionidæ and Lepidoptera. Deformities on terminal branches are formed by Aphidæ, Cynipidæ and Cerambycidæ.

The direct injury done to the stem or timber part of the tree affects the forester most seriously. One of the Cossidæ or Carpenter moths, *Prionoxystus robiniæ*, was taken emerging from the sugar maple in the vicinity of Ridgeway, Ontario. The work of this Cossus moth was noticed in several trees in the same vicinity. These same maples are infested with one of the Siricidæ which I take to be *Tremex columba*. (Fig. 28.)

In the College nursery some Austrian pines about three feet high showed signs of dying in August. Upon examination it was found that the stems in some places were completely girdled beneath the bark. This work was being done by one of the Curculionidæ, *Pissodes strobi*, (Fig. 61), described in Bulletin 22, Division of Forestry. In July the leaves of these pines began to droop and by August they had turned quite brown. In the second week of October I took a number of mature insects from their little cells beneath the bark. Upon a further examination about the first of November I found they had left this retreat for hibernation in other quarters.

Fig. 61. Pissodes strobi, Pine-Curculio.

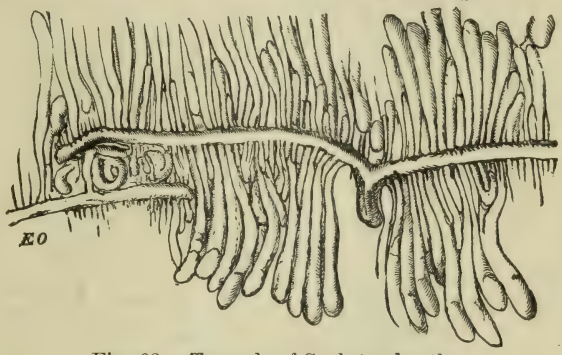


Fig. 62. Tunnels of Scolytus beetle.

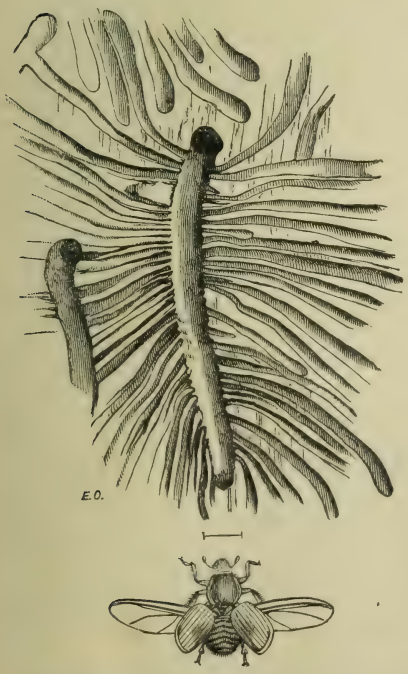


Fig. 63. Scolytus beetle and its tunnels.

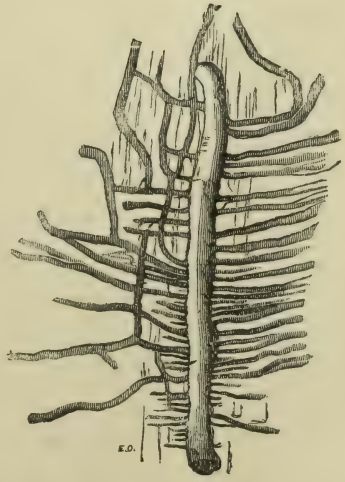


Fig. 64. Tunnels of Scolytus beetle.

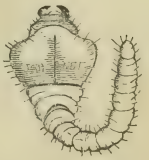


Fig. 65. Buprestis borer.

However, the insects which do the most serious technical injury to trees are the Scolytidæ, Buprestidæ and Cerambycidæ. These insects by boring either in the cambium layer, sapwood or heartwood of the tree leave channels which greatly lessen the commercial value of the tree. They attack the living tree in the forest, the log at the drive or mill, and the lumber in the yard.

The Scolytidæ work in the bark, cambium layer and sapwood (Figs. 62, 63 and 64) and this family is one most to be dreaded by the forester. Large areas of forests have been destroyed by members of this family. It would be impossible to estimate the value of timber destroyed by the pine bark beetle, *Dendroctonus frontalis*. Its distribution seems to cover the whole coniferous region east of the Rocky Mountains. An unidentified species of Scolytidæ has been doing some damage this season in the nursery to Scotch pine. The beetle is about two mm. long and has completely undermined the bark.

Buprestidæ (Fig. 65) and Cerambycidæ (Figs. 66 and 67) injure the stems of the tree in much the same manner. In some cases they make channels throughout the stem although some species work only beneath bark and in the sapwood.

Fig. 66. Cerambycid beetle (wood-borer).

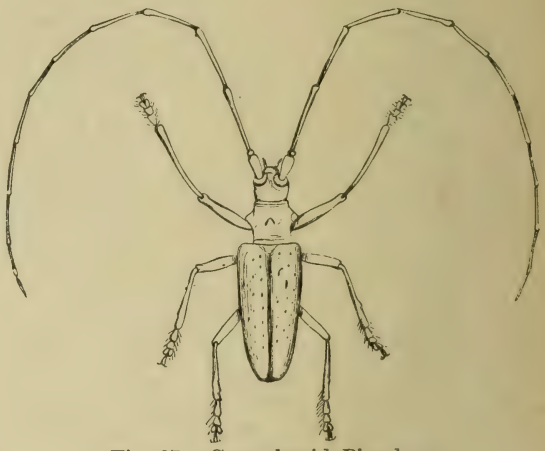


Fig. 67. Cerambycid Pine-borer.

The stems of second growth hickory (*Hicoria ovata*) in the vicinity of Ridgeway have been badly infested with the larvæ of *Goes pulchra*. The same trees are also attacked by *Dorcaschema nigrum* which girdles the terminal branches. Even after the tree leaves the forester's care it is liable to insect attacks. Upon examination of some hickory lumber, which had been piled so that the boards were in close contact, I found *Phymatodes variabilis* doing great damage. Thus throughout the whole history of the tree it is subject to insect injury and the amateur entomologist feels that the species to be studied are almost infinite in number.

From the systematic collector's efforts probably a large percentage of our forest insects in the adult form are now in collections throughout the country. However, this is a subject of economic importance, the forest being one of our greatest resources. Very little is known concerning the life history of our forest insects and only by research can the required knowledge be obtained. There is a wide field for the study of forest insects in relation to plant host, parasites or other enemies. Future protection can only be had in so far as we have men specially trained who recognize and understand the movements of these tiny foes.

PHLOX MITE—TETRANYCHUS BIMACULATUS.

By T. D. Jarvis, Ontario Agricultural College, Guelph.

This species of mite, for several years past, has caused injury to the cultivated perennial Phlox on the College Campus. It answers to the description of the "Red Spider". The leaves become spotted above and the under surface is coated with a fine loose web containing many minute particles. The small red oval mites may be seen with the naked eye and they vary from a few to as many as fifty or more on the under surface of a single leaf. (Fig. 68.)

Length of mite .433 m.m.; width .241 m.m.

Length of front legs, .241 m.m.; length of mandibles, .016.

Length of cephalo-thorax, .040 m.m.; length of hairs on legs, .100 m.m.

The legs of the mites are slightly orange or yellowish in color and six jointed.

The mites hibernate on the lower leaves of the plant. Up to the 20th of May the mite may be found feeding on the basal leaves of the plant.

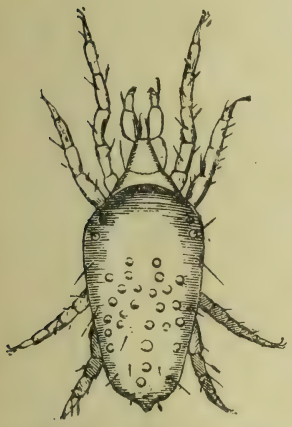


Fig. 68. "Red Spider," greatly magnified.

Fig. 69. Spruce Saw fly—greatly magnified.

BLUE-SPRUCE SAW FLY—LYDA SP.

By T. D. Jarvis, Ontario Agricultural College, Guelph.

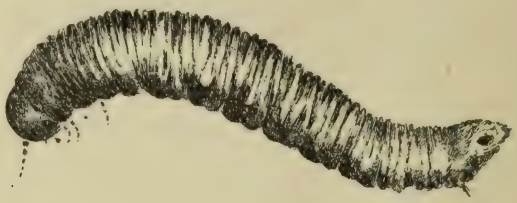
This Sawfly has caused injury to the Colorado Blue Spruce, *Picea pungens*, on the College Campus at Guelph. It has not been found on any other species of spruce on the Campus.

The excrement of the larvæ lies in masses on the leaves and branches, and in some cases the tree becomes very unsightly. The larvæ are found in small colonies of from three to ten feeding beneath the masses of excrement. They cut off the leaves and carry them to their retreat under the excrement.

The larvæ (Fig. 70) are green and when full grown are 26 m.m. long and the antennæ 1½ m.m. long. The head and prothroax are black. The

hair-like appendage on posterior segment of abdomen 1½ m.m. long. The abdomen contains 11 segments.

When mature the larvæ drop to the ground and make a little cell about 3 inches below the surface of the sod. They pass the winter as larvæ and pupate in the spring.



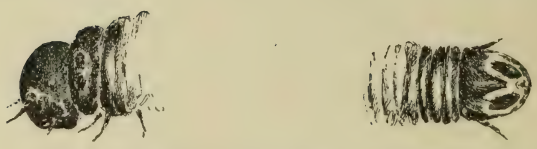


Fig. 70. Spruce Sawfly larva; head and anal segments—greatly enlarged.

The adult Sawflies (Fig. 69) appear about the 20th of May. They spend only a few hours depositing their eggs and then disappear. The sawfly is a large, black, shiny insect, about 14 m.m. long. The mandibles and a part of the face is yellow, the rest of the body is black. The thorax is feebly punctured. The antennæ are about 9 m.m. long and 32 jointed. The upper wings are mostly clear, while the lower wings are clear above and dusky toward the outer margin.

BUMBLE-BEES THAT FERTILIZE THE RED CLOVER.

By T. D. Jarvis, Ontario Agricultural College, Guelph.

In the month of June Mr. C. C. James, Deputy Minister of Agriculture, mailed to our department a letter which he had received from the New Zealand Government, enquiring for information on the species of Bombus that fertilizes the red clover in Ontario so that they might find out what species is most useful in clover fertilization.

The following is a copy of the letter received from Mr. O. B. Pemberton, Secretary of the Canterbury Agricultural and Pastoral Association, Christchurch, New Zealand, 26 May, 1905.

The Secretary of Agriculture.

Sir,—I take the liberty of writing to you on behalf of this Association regarding the fertilization of Red Clover in Canada.

A Committee of this Association has been appointed to enquire into the fertilization of red clover in other countries with the view of the introduction of the bees most suitable as fertilizing agents.

Before the introduction of the humblebee into New Zealand from England in 1855, the yield of red clover seed was not sufficient to be commercially payable. Since the introduction, however, the yields have been more prolific, but it is still thought that the best results have not yet been obtained.

We have in New Zealand, as far as we know, three kinds of humblebees, the descendants of those imported in 1885, viz., *Bombus terrestris*, *Bombus hortorum*, and *Bombus hortorum* variety *Harrisellus*. *Bombus terrestris* is the most numerous and is, I believe, considered quite unsuitable on account of the shortness of its proboscis.

My Association would deem it a great favor if you could forward me any information you may have gathered as to what bees or insects you have in Canada most suitable for the fertilization of the red clover.

Forty-eight specimens of bumblebees were collected from the flowers of the red clover. The specimens were sent to Dr. McGillivray, Cornell University, and identified. Three species were found—*Bombus fervidus*, *Bombus ternarius* and *Bombus borealis*.

Dr. Brodie, of Toronto Normal School, reports *Bombus consimilis* as being one of the more common species around Toronto.

Dr. Fletcher stated that *Bombus fervidus* is the most common species at Ottawa, while *B. borealis* is rare.

INJURIOUS INSECTS OF 1905 IN ONTARIO.

By W. Lochhead, Ontario Agricultural College, Guelph.

The number of injurious insects in the season of 1905 was about the normal, but the amount of damage done to crops of all kinds was perhaps below the normal,—there being no outstanding case of very serious loss.

The *Pea-weevil* no longer gives anxiety to the growers of peas, but in this apparent security from this pest lies the danger for the future. The farmer just now is able to give practically a death-blow to pea-weevils for many a year if he would insist on sowing only peas that have been fumigated with carbon bisulphide. It is an easy task to conquer and control an enemy when it is weak; and this is the present condition of the pea-weevil. If this precaution of using fumigated seed is not taken, the weevils will increase every year until they are beyond control.

A species of Joint-worm, (see Fig. 29), probably *Isosoma hordei*, was present in a few localities on wheat and barley, but did very little damage. It produces galls at, usually, the second joint of the stems, which are consequently deformed and weakened. Within the galls are the minute yellowish-white maggots with blackish jaws. The larvæ usually remain over winter within the galls, and the adults, small black four-winged flies, emerge in the spring. Fortunately there is only one brood each year.

It is doubtful if this Joint-worm will ever become a serious enemy in Ontario, where the majority of farmers practise a system of regular rotation of crops, and where the roadside and fence corner grasses are cut at the time of haying.

The Horn-Fly (Hæmatobia serrata), was more prevalent over the Province this past season than it has been for several seasons. Although this insect is now well known by nearly all farmers, yet it is remarkable how few stock-owners apply the simple treatments that have been advocated for years by the practical entomologists. This fly, it is well known, is one of the most annoying and troublesome pests of cattle in summer, and young cattle in good pasture are frequently annoyed to such an extent that they lose rather than gain flesh. Milch cows, too suffer much from these flies, and the supply of milk is always very much reduced in quantity during the "fly" season.

The life-history of the Horn-fly is well known. The eggs are deposited in fresh cow droppings, where the maggots develop and the pupæ form.

There are many broods during the season, so that their increase is very rapid. The adult flies are smaller than the house-flies. They congregate in masses about the base of the horns, on the flanks, and on the belly, just outside the reach of the tail or head of the afflicted animal.

For several years it has been observed that oils or greases rubbed on the affected parts will give relief for several days, and the flies will not come near. Fish oil is strongly recommended and has been used by many owners of stock. The addition of crude carbolic acid in the proportion of one tablespoonful to one quart of fish oil increases its effectiveness.

This past summer I had an opportunity of testing the effectiveness of kerosene emulsion solution against the Horn-fly. The emulsion is readily made and in the usual way, and was applied by means of a small hand spray pump. A fine nozzle was employed so that a very fine mist was obtained. I found that although the emulsion gave almost immediate relief and killed enormous quantities of flies that collected in the stable, yet it was necessary to repeat the operation during the worst portion of the season, both night and morning.

Unless I was present, the spraying operation was usually neglected, and the flies became as numerous as ever. It became apparent to me that if the stable employees about a large stock farm found it difficult to apply this kerosene emulsion sufficiently often to keep the flies away, we need not expect to have any better results in the ordinary farm stables where stock is probably not as well cared for.

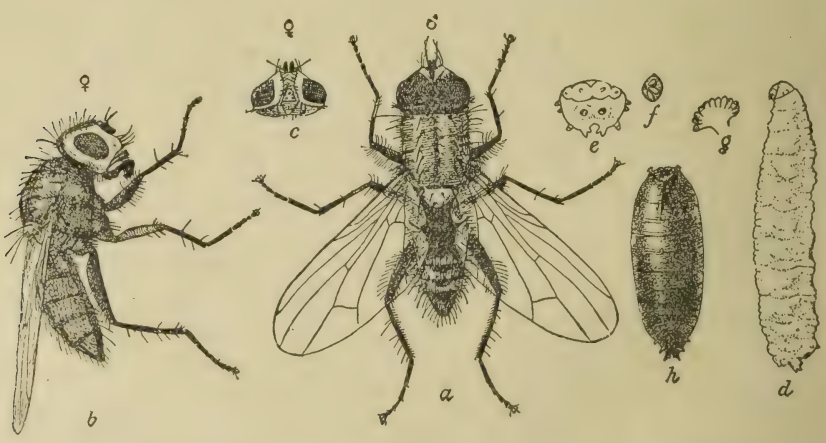


Fig. 71. The Seed-corn Maggot; *a*, *b*, flies; *d*, maggot; *h*, puparium—all very much enlarged. (After Chittenden, U.S. Dept. Agriculture).

In the dairy stables of the Ontario Agricultural College Zenoleum was used. It was applied with a compressed air sprayer. As it is readily made, the same objections cannot be found with regard to its preparation as against the preparation of the kerosene emulsion. The herd was kept free from the horn-fly with but two or three applications per week, and the herdsman is enthusiastic concerning the merits of this preparation.

Again, the use of the compressed air sprayer makes the operation a very simple one, and with the general introduction of such sprayers, we may hope to have less fear for the Horn-fly in the future.

Garden Insects.

The Seed-Corn Maggot (Phorbia fusciceps, Zett), Fig. 71. The work of this maggot on planted corn seed was brought to our attention about the third week in June, at St. Anne de Bellevue on the Island of Montreal. In a field recently planted many of the seeds sprouted very slowly, while others failed to sprout at all. On examination of the planted seeds many of them showed the presence of the Seed-corn Maggot. From the seeds that had not sprouted the maggots had hollowed out large cavities and had destroyed the embryos. In other seeds the cavities were smaller, and sometimes the embryo had escaped injury, with the result, however, that the germs were weak and made but little growth.

The seeds were planted at a time when the soil was cold and damp and for over a week the weather remained cold and wet, with the result that incipient decay set in, and the adult flies were attracted to the decomposed matter as a suitable place for oviposition.

It may be stated here that the stand of corn was a large one in spite of the number of injured seeds. After a dressing of soda nitrate had been given to the land, the crop developed well with returning warm weather, and a fine yield was obtained at the close of the year.

In 1900 I called attention to a destructive outbreak of similar maggots on beans in Lambton County. It is probable that the maggots in this case belong to the same species as those observed at St. Anne's.

The life-history of this insect is not well known. The adult is a two-winged fly about the size of a small housefly. Dr. Chittenden of Washington says it can best be identified by the male, which possesses a row of short, rigid, bristly hairs on the inner side of the posterior tibiæ.

The Seed-Corn Maggot is smaller than the Onion Maggot, being about ¼ of an inch in length. Dr. Chittenden says: "In the Northern States it is probable that we have at least two generations, the first injurious in May and June to such seedlings as are then to be found, and the second generation feeding upon weeds or dead or dying plants, in excrement and in refuse without their presence being manifested.

It has been surmised that the species agrees with others of its kind in passing the winter in the adult condition, although it is possible also that it hibernates in some localities at least as a puparium."

Professor Garman of the Kentucky Agricultural Experiment Station reports that this insect attacks young cabbage plants, in early spring, and hemp plants which are often destroyed over large areas. "The maggots work in the stems, but leave the plants, when ready to pupate, and enter the earth for a short distance, changing to yellow pupae .18 inch long and about .06 inch in diameter. Besides hemp and cabbage the insect is known as an enemy of planted seed corn, of radishes, onions, and of the common weed, hedge-mustard." Professor Garman calls this insect the *Fringed Anthomyian*, and places it in the Genus Pegomya.

The Tarnished Plant bug (*Lygus pratensis*). Many reports reached us throughout the season regarding the injuries done by this insect to cultivated plants of both the garden and orchard. In the garden it was specially injurious, for it pierced and deformed buds and terminal shoots of cabbage, cucumber, and potato, and sucked their juices. Flower gardens and plantations of small fruits suffered also, and reports came in of the blighting of strawberry blossoms and young berries, and of the blackening and shriveling of the currants. Besides, these insects attack many weeds and other wild plants. The insects are more numerous, and hence more readily notice-

able by the public, in late summer, but most of their injuries are done in early summer.

The Tarnished Plant Bug (Fig. 72), is one of the true bugs, and obtains its food by piercing the tissues with its beak and sucking the juices. The adult insects are about 1-5 of an inch long, and are very variable in color, ranging from a dark brown through light brown to yellowish or yellowish-green. The broad region behind the head (prothorax) is bordered with yellow, and has four or five longitudinal yellowish lines; the triangular area behind the prothorax bears also a yellow V, and the upper wings are marked with dark and light spots.

The adults winter over under rubbish, and are ready in the early spring to attack the young buds and fruits. Their eggs are deposited on the food plants, and in a few days the young larvæ or nymphs appear. All through the season nymphs and adults may be found feeding together. The nymphs moult four or five times, gradually becoming more like the winged adults. There are probably only two broods in Ontario.

Fig. 72. The Tarnished Plant-bug—much enlarged.

On account of the fact that Tarnished Plant Bugs have a wide range of food plants, hence are widely distributed, and occur at all times of the season in every stage of development, treatment is difficult. The following remedies have been found somewhat effective and are here recommended:

1. The use of pyrethrum or insect powder. This should be mixed with four or five times its weight of flour and dusted on such plants as strawberries, garden flowers, cucumbers, potatoes, &c., in early morning while the insects are torpid and the dew is on the foliage.

2. The bugs may be readily shaken from infested trees and shrubs in early morning upon a sheet, and destroyed.

3. The application of a kerosene-emulsion spray or some good tobacco solution in early morning will destroy large numbers of the bugs, and help to keep them in check.

Root Maggots belonging to different species of insects attack the roots of cabbages, onions, and radishes, and do a great deal of injury. These along with the white grubs and wireworms are the *bêtes noires* of truck-gardeners. No satisfactory remedies have as yet been discovered for their control, and great losses are sustained every year through lack of information and treatment.

We are, however, specially indebted to Professors M. V. Slingerland and S. A. Forbes for their valuable investigations into the life-histories of

these troublesome root insects, and for their experimental studies of remedial treatments. It is now fairly well known that many of the so-called remedies are utterly worthless.

The most common root maggots that are found affecting vegetables are the Cabbage or Radish Root maggot, and the Onion Maggot. The adults of these are small flies. These lay their eggs on the stems of the plants near the ground and the maggots on hatching make their way down the stem and begin burrowing into the roots. It is a common thing to find the surface of the roots of young radishes completely mined by maggots. When full grown these maggots form brown puparia in the soil. The cabbage or radish maggot does its chief harm in June and July, as the young radishes are coming up and after the young cabbages are transplanted.

With regard to remedies, it may be repeated that no perfectly effective remedy has been found for the cabbage root maggot, but the following remedies are valuable in controlling their depredations to some extent:

(1) Cheese cloth covers. In the large truck gardens of Long Island and New York, many of the growers resort successfully to the use of enclosures made of cheese cloth, arranged about light wooden frames. These may be made of any size, and can be removed at time of cultivation. If such frames are kept over the young plants for about six weeks, injury from these maggots may be completely prevented, since the fly is not able to deposit her eggs on the plants.

(2) Tarred paper disks. These were advocated by Prof. Slingerland, but the great objection to such a procedure is the trouble required to place the disks on the plants, and most growers of cabbages prefer to lose their plants rather than take this extra trouble.

(3) Hellebore or Insect Powder. Both of these insecticides have been used to great advantage. Dr. Forbes says "about one-half tea cupful of a decoction of pyrethrum powder, four ounces to a gallon of water, or white hellebore of the same strength, poured around the root of each plant after drawing away the earth right down to the roots, will destroy any maggots which may have started work. The earth should be put back again and the plants hilled up, when new rootlets will soon be formed. A light sprinkling of nitrate of soda will encourage a quick growth and help the plants to overcome attack."

For radishes white hellebore used as a powder and dusted along the rows once a week has given good results; and a carbolic wash prepared originally by Prof. Cook by dissolving one pound of hard soap in a gallon of water and one-half pint of crude carbolic acid added, then the whole is boiled together for a few minutes to make a stock solution, which should be diluted fifty times with water when required for use. This solution should be sprayed upon the plants once a week from the time they appear above the ground until ready for use.

White Grubs. These are the well known larvæ of June Beetles. The adult beetles deposit their eggs just below the surface of the ground and the grubs hatching feed on the roots of plants for from two to three years. In Bulletin 44 of the Illinois Agricultural Experimental Station, Dr. S. A. Forbes states that the grubs do not change to pupae until June and July of the third season,—the perfect beetles transforming in September but not emerging until the next spring. White Grubs are often very abundant and injurious in garden plots, but a good rotation of crops will do more than anything else to control these insects. Dr. Forbes claims that as the white grubs have an opportunity to develop only in sod land and do not seem to relish the roots of clover plants, it would be well to bring strawberries or

corn late into the rotation. He recommends a short rotation in which rye is sown on the broken-up sod, then seeding to clover the following spring, followed by the small grains, and this followed again by corn or potatoes. If such a method, or a similar one, be adopted in gardens, very few complaints would be heard regarding attacks of white grubs. When white grubs are known to infest lawns, kerosene emulsion may be applied with advantage, if followed by copious watering.

Fruit Insects.

The Peach-Tree Borer, (*Sanninoidea exitiosa* Say (Fig. 73) is quite prevalent in many of the Niagara peach orchards, as the brown gummy masses about the bases of the trees testify. These exudations are composed of a mixture of earth, larval excrement, and borings, and sometimes they extend entirely around the tree. The borer is the grub-like caterpillar of a beautiful moth, and works in the inner bark of the lower trunk or a large root, excavating a tunnel.

The life-history is not yet well enough known to the peach growers. The moths appear from July to September, and the females deposit their eggs on

Fig. 73. Peach-tree Borer; 1, female moth; 2 male moth.

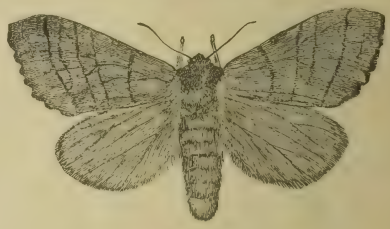


Fig. 74. Datana moth.

the bark of the trunk near the ground soon after their emergence. The larva hatches in a week or so and begins to bore into the trunk, feeding and forming its burrow until winter sets in, when it hibernates. In May the larva begins again to feed, and reaches full size in June or early July. It leaves its burrow then, and forms a dirty brown cocoon at the base of the tree. As a pupa within this cocoon, it remains about three or four weeks, when the moth emerges.

The old-fashioned method of "digging out" or "worming" the borer is perhaps the best that has been devised. The best time to do this work is in spring and fall, and it must be thoroughly done on all the trees.

The practice of "mounding" the trees in early summer is frequently recommended, as it compels the deposition of the eggs some distance above the ground, and the chances are that the birds and predaceous insects devour the young larva before it has a chance to bore into the trunk.

Wrapping the trunk with tarred paper in July and washing the trunk twice with a thick wash composed of "two quarts of strong soap, a half pint of crude carbolic acid in a pail of water with enough of lime and clay to make a thin paste," are methods often used by fruit-growers with considerable success. These methods will give best results if they are made auxiliary to the worming process.

The San Jose Scale (*Aspidiotus perniciosus* Comst), has extended its area considerably during the year, not only in the Niagara district but also in the south western part comprising the counties of Kent and Essex. In the latter region little or nothing is being done by the owners of the trees to control the scale, so that its spread has been very rapid.

In the Niagara district there are now areas thoroughly infested which the inspectors three years ago reported "clean." The number of dead and dying orchard trees is becoming larger every year, and many fruit-growers have had to go out of business because they would not spray.

In another article in this Report I give an account of some experiments which Mr. P. W. Hodgetts and myself conducted to determine the efficiency of the newer scale remedies.

The Codling Worm (*Carpocapsa pomonella*) was perhaps not so destructive this year as usual to apples. The Fruit Marks' Act is in many instances compelling apple-growers to spray their trees, for XXX or No. 1 fruit must be practically free from worm and scab.

The Rose Chafer (*Macrodactylus subspinosus*) (Fig. 30) appeared in large numbers in one or two peach orchards along the lake shore in the Niagara district. This insect is a brownish, long-legged beetle, and breeds in sandy, undrained meadow land. The eggs are laid in the ground and the grubs feed on the roots of grasses. By autumn they reach full growth; in spring they pupate and the adults emerge in June or July. Sometimes these beetles fly in hordes to adjacent vineyards and peach orchards, where they devour the foliage and eat holes in the young peaches. Under such conditions little can be done for arsenicals do not seem to have much effect in diminishing their numbers. Usually they disappear as suddenly as they came. The only remedy to prevent future recurrences of these beetles is to break up and cultivate the meadow land, their breeding places.

The Apple Maggot (*Trypeta pomonella*) is a serious enemy of apples in the eastern part of the Province and Quebec. Its work is readily recognized, as the maggot tunnels the pulp of the apple in all directions, thus rendering it worthless. The adults of these maggots are two-winged flies. They make their appearance in early summer and deposit their eggs through the skin of the apple. The maggots on reaching maturity crawl out of the apple, and transform to pupae in the ground, where they remain all winter.

Spraying as a treatment for this insect is of little or no value. The fallen apples and those infested with maggots should be fed to hogs; in fact, where these maggots are present every year, the hogs should have free run of the orchard.

Grape-Berry Moth (*Polychrosis viteana*, Clemens). (Fig. 34). While engaged in carrying on spraying experiments in vineyards in the Niagara district this season, we found many cases of grapes which were infested with a small dark caterpillar. This caterpillar was quite abundant in some vineyards and was evidently doing much harm. We were not able to work out the life-history of this insect on account of the limited time at our disposal, but we glean the following information from Bulletin 231, "The Grape-Berry Moth," by Prof. Slingerland of the Cornell Agricultural Experiment Station, November, 1904.

The winter is passed in the pupa state in the cocoon, which is most commonly observed on damp and decaying leaves near the ground under the vines. About the first of June the moths escape and deposit their eggs, probably on the stems of the blossom clusters. The early caterpillars begin feeding before the grape blossoms are fully opened, and they often destroy the bud blossoms. Throughout the blooming period the caterpillars continue to work and destroy many of the young developing fruits. This first, or spring, brood of caterpillars feed on the outside of the blossoms and berries, and are thus readily treated with poisons. By July the first most of the caterpillars have reached full size and soon make their peculiar cocoons out of leaves fastened together by silk threads, and lined on the inside with white

silk. Within three or four days, the caterpillar, after forming its cocoon, transforms into a pupa, and a couple of weeks later the moth begins to emerge. Eggs are again laid for a second brood, and this summer brood of caterpillars works during the latter half of July and August. The eggs of the summer brood are laid on the skin of the green berries or on the stems. The most injury is done by this second brood of caterpillars, since in Ontario vineyards the number of the second brood is very large. Many of this summer brood become full grown in August and form their characteristic cocoons and develop moths by the first of September. Some, however, hibernate as pupae, so that there is only a partial third brood in the autumn. Some of the caterpillars of the third brood are full grown before October the first, and transform to pupae within the berries, but most of them make their characteristic cocoons on the leaves like the earlier broods.

Prof. Slingerland recommends the following treatments for the Grape-Berry Moth:

(1) The destruction of fallen leaves. As has been stated, the cocoons winter over on the leaves near or on the surface of the ground. It is evident that the gathering and burning of fallen leaves will destroy the great majority of the cocoons. He also advocates early cultivation, especially the land along the trellis under the vines, in which case many of the hibernating pupæ will be buried and destroyed.

(2) The bagging of clusters of grapes, by putting paper bags around the clusters soon after they have set. This is practicable only to a limited extent, but many grape-growers find that it pays to bag many of their choice grape clusters.

(3) The picking of infested berries in August. It is a comparatively easy matter to detect grapes infested with the Grape-Berry Moth caterpillar, and when such berries are picked and destroyed, much injury can be averted and the surrounding grapes can be saved.

(4) The application of arsenical poison sprays. Experiments were conducted in the Chatauqua district during the last two or three seasons, and successful results have been secured from the application of arsenical poisons, and Prof. Slingerland strongly advocates their use in infested vineyards, but states that the poison spray is effective only against the spring brood of caterpillars working in the blossoms, and recently set clusters. He advises two applications at the rate of four pounds of arsenate of lead in 50 pounds of water or Bordeaux Mixture. The first application should be made before the blossoms open and the second just after the blossoms fall. Now that many of our grape-growers are using Bordeaux for the control of the Black Rot and the Mildews, it is an easy matter to add the arsenical poisons to this mixture, so that the Grape-Berry Moth can be controlled at the same time as the fungus diseases.

Shade Trees.

The Spiny Elm Caterpillar, the larva of the Mourning Cloak butterfly (*Euvanessa antiopa*) was more numerous than usual this summer on elms. This caterpillar is not often sufficiently numerous to attract attention, or to destroy foliage. The different stages of this insect are interesting. The winter is passed as a butterfly, and almost any bright day it may be seen flitting about as if it enjoyed the sunshine. Its wings are of a dark, rich purplish-brown color with yellowish borders, dotted with brown. Its eggs are beautifully sculptured, and are laid in compact clusters about a twig. The caterpillars are salt-and-pepper colored with a row of red spots along

the middle of the back, and their bodies are protected by many branched spines. Their chrysalids are also spiny and they occur suspended by the tail.

The caterpillars of the *White-Tipped Moth* (*Edema albifrons*) were also very abundant this fall on the leaves of the hard maple about Guelph. They are readily recognized by their smooth, shiny body, by the numerous fine yellow and black stripes, and by the orange-red head, and the orange-red hump near the end of the body.

The Walnut Datana Caterpillars (*Datana Sp.*) (Fig. 74) were very numerous on walnut trees in the south western part of the Province in August and September, and in many cases stripped the trees of their leaves. These larvæ when full grown are about two inches in length. To the owners of shade walnuts and hickories the habits of these caterpillars are rather mysterious. When disturbed the caterpillars raise both ends of their bodies to assume a threatening attitude. They feed in colonies and at moulting period they descend the trunk of the tree and congregate in a large mass. When full grown they descend to the ground to pupate, hence their mysterious disappearance at this stage. The moths are brown, with bars crossing the front wings, which may expand one and three-quarter inches.

These caterpillars can be readily poisoned by Paris green applications, and at moulting periods captured *en masse*.

Fall Web-Worms (*Hyphantria cunea*) were more numerous this year than usual. Usually the webs are confined to forest trees, but this fall their webs were observed in many vineyards, on currant and raspberry plantations, and in apple orchards.

Their webs are unsightly objects, especially when they are large, and become filled with dead leaves, moulted skins, and excrement. The caterpillars differ in their habit of feeding from the Tent Caterpillars, as they always feed within the web. Moreover, they are very variable in color and markings,—some having a black band along the back and long white hairs, while others have two rows of prominent black marks instead of a band, and have shorter hairs.

The pupae are formed within cocoons, and are usually found at the surface of the ground, mixed with dirt, in crevices of bark of trees, under fences, &c. The moths appear in early summer, and the eggs are deposited in flat masses on the under surfaces of leaves.

There is but one brood a year in Ontario. Two or three lines of treatment may be adopted against the Fall Web-worm: (1) to spray the caterpillars with arsenical poisons, such as Paris green or arsenate of lead; (2) to destroy the webs by burning them on the tree with a torch; and (3) to clean up all refuse so as to destroy the hibernating cocoons.

The Cottony Maple Scale (*Pulvinaria innumerabilis*) was even more destructive this year than last, having been reported from many towns in the western peninsula. Briefly, the life-history is as follows:—The females winter over on the twigs, and in spring begin feeding and secreting a cottony mass for the reception of the large number of eggs which are laid at this time. The larvæ soon hatch by the thousands, and swarm over the leaves and twigs. They soon become fixed and begin forming a scale-like covering. In August they become mature, and usually in September females are fertilized by the males who die soon afterwards.

Treatment is rather difficult, but much may be done by spraying the trees with the kerosene-soap emulsion at the time the larvae are crawling. Success has followed the application of strong streams of cold water in spring, when the eggs are dislodged from the cottony mass and are destroyed. In some cases winter and spring pruning is beneficial. It is very probable,

however, that the insect enemies of this scale will soon get the upper hand and keep it in check.

The Spruce Gall Louse (*Chermes abietis*) is extending its range every year, but in the older sections the parasities are apparently keeping it in check. There are two broods annually; the eggs of the first brood appear in May in fluffy masses on the affected spruce twigs, the second in August.

Judicious pruning when practicable, and applications of kerosene-soap solution in May when the larvae are hatching will do much to prevent the spread of this insect.

The Tussock Moth (*Orgyia leucostigma*) was very injurious in our large cities, but much information has been written in this and previous reports regarding it, and it is only necessary here to note its occurrence.

REPORT OF THE BRITISH COLUMBIA BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO FOR THE YEAR 1905.

The fourth annual meeting was held February 6th, 1905, at the Queen's School, Vancouver. There were present Rev. G. W. Taylor (President) in the chair, T. Wilson (Vice-President), R. V. Harvey (Secretary-Treasurer), A. H. Bush, R. S. Sherman, R. Draper and J. Towler.

The minutes of the last meeting were read and approved.

The Treasurer presented the balance sheet for the year 1904, which was passed.

The retiring officers were re-elected for the ensuing year.

It was unanimously resolved that the British Columbia Entomological Society should become an affiliated branch of the Entomological Society of Ontario, and the Secretary was empowered to conduct the necessary negotiations.

The Society now numbers nineteen active members; eight of these reside in the neighborhood of Vancouver, but the rest are so widely scattered through the Province as to make representative gatherings difficult, and severely handicap co-operation in entomological studies.

Individual members, however, have done good work, and the forthcoming list of B. C. Lepidoptera, compiled by Rev. G. W. Taylor, besides his papers on our Geometridæ, which will appear shortly, will show how much has been accomplished in the last few years.

In other orders various members are rapidly accumulating valuable notes and extensive collections: in the Coleoptera, Messrs. Taylor, Hanham, and others; in Hymenoptera, Mr. Venables; in Diptera, Messrs. Venables, Sherman and Harvey.

The season of 1905 was not notable for either abundance of insects or particularly interesting captures. It is worth noting that a moth hitherto regarded as extremely rare, *Lepisesia flavofasciata*, var, *ulalume*, Strk., was taken in some numbers both by Mr. Taylor at Wellington and by several Vancouver collectors round cherry and apple blossom in early spring. Mr. Venables of Vernon records the capture of a specimen of a fine Sphingid, *Marumba modesta*.

R. V. HARVEY,
Hon. Secretary-Treasurer.

Dec. 30th, 1905.

LIST OF CANADIAN MEMBERS OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Province of Ontario.

Abbott, Dr. A. R. .....Toronto.
Albright, W. D.....London.
Andrus, G. A. ..... "
Arnott, Dr. D. H. ..... "
Baker, A. C. ..... "
Baker, Merrit, O.A.C. ....Guelph.
Balkwill, J. A. .....London.
Bapty, Miss Gertrude .... "
Barlow, B. .....Guelph.
Benson, W. D. .....London
Bethune, Rev. C. J. S.... "
Binnie, T. H., O.A.C.....Guelph.
Black, Davidson .....Toronto.
Blackmore, Miss E. ..... "
Blue, John ..... "
Bock, H. P. .....London.
Bond, G., O.A.C.....Guelph.
Bond, I. B.....London.
Boon, Miss Bella C. ..... "
Bowman, Prof. J. H. ..... "
Brodie, Dr. .....Toronto.
Buchanan, J., O.A.C.....Guelph.
Butt, W. .....Oakville.
Butterworth, C. .....London.
Buttery, Miss G. ..... "
Cæsar, L., O.A.C. .....Guelph.
Cornish, G. A. .....Lindsay.
Creelman, Pres't, O.A.C.Guelph.
Dearness, Prof. John .....London.
Dickson, J. R., O.A.C. ....Guelph.
Dunlop, Miss M. V.....Woodstock.
Durand, Napier N. .....Eglinton.
Elliott, W. H. .....Toronto.
Evans, J. D.....Trenton.
Fisher, George E. .....Burlington.
Fletcher, Dr. J..... Ottawa.
Fox, Charles J. .....London
Fraser, W. J. .....Toronto.
Gammage, Wm. .....London.
Gibson, Arthur .....Ottawa.
Goodeve, Miss A. .....Woodstock.
Graham, R. R., O.A.C....Guelph.
Grant, C. E. .....Orillia.
Green, B. .....London.
Haas, S. Ward .....Walkerville.
Hahn, Paul .....Toronto.
Haight, D. H. .....Copper Cliff.
Hallam, R. .....Toronto.
Hallam, M. ..... "
Hamilton, W. H. .....London.
Harrington, W. H. .....Ottawa.
Hicks, F. M. .....London.
Horton, C. W. .....Toronto.
Hotson, J. W., O.A.C.....Guelph.
Hotson, Miss Maude .....London.
Jackson, V. W., O.A.C....Guelph.
Jarvis, T. D., O.A.C..... "
Jones, D., O.A.C.....Bartonville.
Johnston, J.....Guelph.
Keays, J. E. .....London.
Kilman, A. H. .....Ridgeway.
King, R. W. .....Toronto.
Klinck, C. R., O.A.C.....Guelph.
Law, John .....London.
Lawson, F. ..... "
Lochhead, Prof. W. .....Guelph.
MacMillan, H. R., O.A.C. "
Maughan, J., Jr. .....Toronto.
Mayou, Miss .....London.
Mayou, Mrs. ..... "
McCready, Prof. S. B.....Guelph
McQueen, Alex. .....London.
Merchant, Principal F. W. "
Moore, T. J., O.A.C.....Guelph.
Morden, John A. .....Hyde Park.
Mosey, Miss .....Toronto.
Nash, C. W. ..... "
Paine, John .....London.
Painter, A. J., O.A.C.....Guelph.
Parsons, C. E. .....London.
Pearson, Gerald ..... "
Peek, Walter M. .....Freeman.
Priddis, Miss .....London.
Pugsley, E. .....Port Rowan.
Readwin, R. .....Guelph.
Rennie, H. C. .....London.
Rennie, R. W. ..... "
Richard, A. E. .....Ottawa.
Rigsby, Rev. W. .....London.
Sanders, G. E., O.A.C.....Guelph.
Saunders, Henry S. .....Toronto.
Saunders, W. E. .....London.
Sherman, Prof. F., O.A.C.Guelph.
Silcox, Sidney .....St. Thomas.
Simpson, Miss J. .....London.
Slater, A. E., O.A.C.....Guelph.
Smith, Walter .....London.
Spittal, Miss..... "
Stewart, E. .....Ottawa.
Stewart, J. .....London.
Stevenson, Dr. W. J..... "
Stuart, F. A. ..... "
Tanton, John ..... "
Thompson, P. J. ..... "
Thompson, W. Robin ..... "
Thompstone, E., O.A.C....Guelph.
Tyner, S. .....Prescott.
Walker, E. M., M.B.....Toronto.
Watson, Dr. A. H. R.....Port Hope.
Webb, John H. .....Toronto.
Weir, D., O.A.C. .....Guelph.
Westland, Malcolm .....London.
White, James .....Snelgrove.
Wheaton, R. R., O.A.C...Guelph.
Williams, J. B. .....Toronto.
Wood, A. A. .....Coldstream.
Wood, S. T. .....Toronto.
Wood, T. M. .....Baltimore.
Woolverton, Dr. .....London.
Yerex, O. E. .....Little Britain.
Young, C. H. .....Hurdman's Bridge.
Zavitz, E. J., O.A.C.....Guelph.

Province of Quebec.

Barwick, E. C. .....Montreal.
Begin, Rev. Abbe P. A...Sherbrooke.

LIST OF CANADIAN MEMBERS—*Concluded.*

Bickell, Miss .....Quebec.
Boulton, A. R. M..... "
Boulton, Mrs. ..... "
Bowen, Miss ..... "
Brainerd, Dwight .....Montreal.
Brainerd, E. ..... "
Brodie, Mrs. Alex. .....Quebec.
Burgess, Dr. T. J. W. .....Verdun.
Chagnon, Gustave .....Montreal.
Denny, E. ..... "
Dunlop, G. C. ..... "
Elliott, W. R. .....Sherbrooke.
Freeman, Miss I. H. .....Quebec.
Fyles, H. .....Levis.
Fyles, Miss W. ..... "
Fyles, Mrs. ..... "
Fyles, Rev. Dr. ..... "
Geggie, James .....Beauport.
Geggie, Miss Lois ..... "
Gibb, Lachlan .....Montreal.
Griffin, A. ..... "
Hamel, Miss Julia .....Levis.
Hedge, Miss Louisa .....Montreal.
Huard, Rev. Victor .....Quebec.
Johnston, Miss M. G. .....Levis.
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Gould, Henry .....Red Deer.
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