REPORT

OF THE

FRUIT GROWERS' ASSOCIATION

OF THE

PROVINCE OF ONTARIO,

FOR THE YEAR

1875,

TO WHICH IS APPENDED THE

Report of the Entomological Society,

FOR THE YEAR 1875.

Printed by Order of the Legislative Assembly.

Toronto:
PRINTED BY HUNTER, ROSE & CO., 25 WELLINGTON STREET.
1876.

(7)

THE ARNOLD RASPBERRY.

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ANNUAL REPORT

OF THE

FRUIT GROWERS' ASSOCIATION

OF ONTARIO,

FOR 1875.

To the Hon. the Commissioner of Agriculture.

SIR,—I have the honour to submit for your inspection, the Report of the Fruit Growers' Association of Ontario for the year 1875.

Although the past winter was one of unusual severity, yet on the whole the fruit crop has been abundant. In those sections of our Province where the peach can be grown successfully, there was a large yield. Some varieties of fruit, including the grape, scarcely came up to their usual excellence, owing to the unusual coolness of the summer. We have had another remarkable illustration of the fact that, even in the high latitude of the Ottawa Valley, such is the intensity of the heat of their short summers, that many varieties of the grape have ripened better there than in more favoured southern localities.

We call your attention to the fact that certain varieties of apples shown at the Provincial Exhibition in Ottawa, such as the Duchess of Oldenburg, Alexander, Red Astrican and Fameuse, attained to a much higher degree of excellence in the Ottawa Valley than in more southern districts.

It is matter for deep regret, that owing to want of pecuniary means, under which our Society is labouring, we were unable to make a display of our fruits at the meeting of the American Pomological Association at Chicago. We trust, however, that, through the liberality of your Government, we will be enabled to make a creditable display of all the fruits of Ontario at the Centennial Exhibition in Philadelphia during the coming year. The event itself is one that occurs only once in a lifetime, and the opportunity ought to be embraced by our people to show to the world the productions of our country. Our fruits have already attained to very considerable commercial importance, and they only need to be more widely known to cause that importance to be greatly enhanced.

The distribution of copies of this Report at Philadelphia, through the Dominion Commission, would tend materially to an enlarged acquaintance with the fruit-producing capabilities of our country.

The Bureau of Agriculture has courteously submitted to our Directors the proposed amended Agricultural and Arts Act ; we have proposed certain amendments affecting this Association, which we leave to your best consideration.

In closing, we cannot but congratulate ourselves and the country on the relation which you sustain to its agricultural and horticultural interests, and look forward with the expectation that they will be most materially advanced under your wise and liberal administration.

I have the honour to be, Sir,
Your obedient servant,
D. W. Beadle,
Secretary of the Fruit Growers' Association of Ontario.

PROCEEDINGS AT THE ANNUAL MEETING.

The Annual Meeting was held at the Court House, in the City of Ottawa, on Tuesday evening, the 21st day of September, 1875—the President in the chair.

Secretary Beadle read the minutes of the last Annual Meeting.

The Directors' Report was then read, which was as follows :

Directors' Report.

Your Directors take much pleasure in submitting their Report for the present year.

Our Society has continued its beneficent operations, diffusing information on the subject of fruits and their culture, to every section of the Province, whose population evince a continually increasing interest on the subject.

We have noticed with great interest the zealous efforts of many of our most talented horticulturists in the production of new hybrid fruits of great value, and have decided to advance the fruit interests of the country by giving them a wide dissemination. In order that they may be the more widely known and the better appreciated, it is proposed to illustrate our Reports with coloured lithographs of those which give promise of being best adapted to our climate and country.

The Report for 1876 will contain a lithograph of the valuable Raspberries raised by Mr. William Saunders, of London, and Mr. Charles Arnold, of Paris.

Another year's experience confirms us in the conviction that the holding of our meetings at various points contributes largely to the wider circulation of interest, evidenced by the increased attendance and spirited discussions which have marked these meetings of the year.

At Hamilton, the winter meeting was held. The attendance was large, and the interest well sustained. At Drummondville, really important discussions took place on the very principles of horticulture—mulching, and its highly beneficial effects, receiving much attention. These results were amply illustrated by a magnificent display of fruits of the season. At Belleville we had another evidence of the stimulus which the labours of this Association has given to the production of new fruits, in eliciting the largest display of seedling fruits that has ever been exhibited. Most of these fruits have been produced by the application of science to the art of horticulture in the hands of men singularly skilled in delicate manipulations.

Through the courtesy and kindness of our Belleville friends, we had another opportunity of noticing the advantages of the social element in our meetings, relieving the tension of severe discussion by the amenities of social life. In any future reunion, recommend us to the manner in which the intentions of the members of the Horticultural Society of Belleville were carried out by a Palmer and a Wallbridge.

We recommend that the horticultural interests of the Province should be represented

at Philadelphia by an exhibition of our fruits during the entire fruit season. In order to carry out such an exhibition at least $2,000 would be required, and application should be made to the Dominion and Local Governments for the necessary aid.

Several Committees were appointed to examine and report on the fruit capabilities of the various sections of the Province. No reports have as yet been received.

The Hon. the Postmaster of the Dominion has kindly so amended the Postage Act as to allow of our certificates of membership passing through the mails at a cent, a boon which we have long sought.

The Directors congratulate the Association upon the progress that has been made, and the good work done, whereby we have contributed much to the advancement of fruit culture at home, and to our reputation as horticulturists abroad.

It is with deep regret that we are this year called on to deplore the removal by sudden death of one of the eminent members of our Board, Mr. John Gray, Sr.

He was always wise in counsel and ready to promote the interests of our beloved culture ; kind and conciliatory in manner, enthusiastic in the pursuits of horticulture. His loss will long be felt, and his place at our Board not easily filled.

All which is respectfully submitted.

ROBERT BURNET,
President.

The Report was accepted.

The Treasurer submitted his Report, which was received and referred to the Directors.

The President read his Annual Address, which was received with the thanks of the meeting, coupled with the request of a copy for publication.

The meeting then proceeded to the election of officers.

Messrs. Bucke, Saunders, Vanduser, Dempsey and Burnet were appointed a Committee on Nominations. The Committee withdrew for a short time, and after consultation made their Report, which was received and adopted.

The following are the office-bearers for the year :—

President.—Rev. Robert Burnet, Hamilton.

Vice-President.—Peter C. Dempsey, Albury.

Secretary Treasurer.—D. W. Beadle, St. Catharines.

Directors.—P. E. Bucke, Ottawa; Charles Arnold, Paris ; William Saunders, London; A. M. Smith, Grimsby ; George Leslie, Jr., Toronto ; George Elliott, Guelph ; Henry Macpherson, Owen Sound ; John McGill, Oshawa ; W. H. Mills, Hamilton.

Auditors.—Wm. Haskins and Henry Colbeck, Hamilton.

The subject of making a display of our fruits at the Centennial Exhibition at Philadelphia was then considered. Mr. W. H. Frazer, of the Advisory Board, was heard, and recommended that we should endeavour to do the best in our power. The Hon. James Skead also spoke, and gave his experience in regard to the Exhibition of 1851, and to the value of such Exhibitions in making known the nature of our products ; Mr. Ira Morgan following in a similar strain.

Thereupon it was moved by Mr. Wm. Saunders, and seconded by Mr. P. E. Bucke, "That we, the members of the Fruit Growers' Association, pledge ourselves to do our utmost to make the exhibition of fruits at the forthcoming Centennial Exhibition at Philadelphia a success, and also to do everything in our power to influence all those interested in fruit culture in the same direction."

On motion of Mr. Saunders, the President, Secretary, Mr. Arnold, and the mover were appointed a Committee to draft a report giving a plan for the collection of fruits, &c., and an estimate of the necessary expenses, and present the same to the Advisory Board of Ontario, and that they also wait personally on the Dominion Minister of Agriculture, the Hon. Letellier de St. Just. Adjourned.

TREASURER'S AND AUDITORS' REPORT.

D. W. Beadle, Treasurer, in account with Fruit Growers' Association.

Dr.		Cr.	
1874–75.		By balance due Treasurer last audit	$89 34
To amount Members' fees	$1,736 00	" expenses of Directors and Committees	230 01
" " Government grant	1,000 00	" amount postage and telegraph	165 27
		" " commission for collecting dues	75 16
		" " Express charges	6 84
		" " Illustrations, plain and coloured	387 25
		" " Prizes	40 00
		" " Trees and packing	1,288 96
		" " Printing	55 00
		" " Stationery	23 38
		" " Advertising	9 00
		" " paid Clerk	110 50
		" " paid for care of room for Meetings	6 00
		" " Sundries	24 84
		" " Secretary-Treas. salary	200 00
		" " balance in Treasurer's hands	24 45
	$2,736 00		$2,736 00
1875.			
Oct. To balance in Treasr's. hands	$24 45		

Having examined the vouchers for the above items, we hereby testify to the correctness of the above account.

(Signed) James Taylor, W. J. McCalla, } *Auditors.*

President's Address.

The close of our horticultural year finds us assembled in the beautiful metropolis of the Dominion. No place can have more inducements than this to stimulate our efforts as an Association to go forward in our march of improvement for the occupancy of the whole land. In this city we have the grand in nature, the exquisite in art, and the lovely in landscape. All combine to urge attention on our fellow-citizens and fellow countrymen to be up and doing in further adorning the magnificent scenery around with the beautiful features of Pomona, and to fill to overflowing the already autumn-burdened barns of the agriculturist with the rich and juicy fruits of our orchards, bringing in their use happiness and wealth.

When, in due time, this city and neighbourhood, mainly through the exertions of the members of our Association, are made beautiful through abounding plantations of apple, pear, cherry, and hardy grape vines, where could the dust-covered traveller find a more enchanting scene, or one more calculated to reward the trouble and anxiety of the labourer in ornamentation? A locality that has received, and which universally is admitted to have merited, the preference and choice of Royalty, may well form the subject of honest laudation and of horticultural interest by the members of our Association.

Our every effort, too, to advance our personal though unselfish interests, will go far I am persuaded, to render Ottawa and the Ottawa Valley the praise of the Dominion and the peerless queen of beauty of our Province of Ontario.

Fruit and fruit interests may be considered by some as in a backward state in this eastern district; but, let me ask, in what districts have these interests not been backward and lagging, till advanced by the energy, and forwarded by the taste, of some disciple of art and student of nature? However backward, we are not supinely to fold our hands, and indifferently allow other interests besides ours to make rapid strides in the onward march of progress, but our duty is evidently to devise means and make use of every plan to further horticulture in a district like this, capable of sustaining its millions of population, and with verge and scope enough to form a State, having for its highway the magnificent Ottawa River for its main, and the diverging streams of beauty on its right and left for feeders.

The originators of and the co-labourers for the advancement in all material prosperity of a country like this, may not at present reap the fruit of their doings; posterity, however, will adequately recognise their efforts, and crown their brows with a diadem of immortality.

Let us, then, members of the Fruit Growers' Association of Ontario, arouse ourselves, and let the motto of our Society be more legibly emblazoned on our banners than it has yet been—Forward, and Onward!—prosecute with diligence and assiduity the great work which we have on hand—let us more emphatically than ever recommend the sowing of the best seeds of our best fruits—encourage the raising of new and hardy varieties—inculcate the use of the best arts of cultivation—study the changes of nature—extend our observations and labours, till the Ottawa Valley and all the unfruitful places in our Far West rejoice and blossom.

It must be admitted—the fact is not to be denied—that many difficulties occur in the carrying out of our benevolent and patriotic objects. There is the weighty indifference of multitudes of people, who see no beauty in and have no admiration for the benefits accruing from our favourite cultivation; the disappointment to fruit growers from having unintentionally planted varieties not true to name—the desolations consequent on the ravages of the borer and blight—the dire evils springing from the winter cold, and the baneful effects of the scorching heat of our almost tropical summer.

The two last mentioned causes of difficulty in fruit culture have been especially prominent and prevalent since our last annual meeting. Indeed, we question if ever fruit growers had to contend with more malign influences than those which have prevailed during the past winter. The season was exceptionally severe, and some noticeable and remarkable effects resulted to almost all vegetation from its severity. The apple, pear, plum, cherry and grape suffered greatly. There are few horticulturists but have to lament the destructive inroads made on their orchards. Scarcely an orchard escaped the biting blast. It matters little the aspect—trees on southern slopes suffered as much as those on northern exposures. Nor were other varieties of trees exempt. The hardy oak, the luxuriant maple, the stately pine, and the lowly shrub alike suffered, and this not in one district, but almost everywhere. Confessedly hardy varieties were more injured than certain others that were previously known for their tenderness. Philadelphia raspberry was cut down, while in its neighbourhood the hornet stood the winter pretty well. Grape vines in southern exposures were scathed, while the same varieties in northern aspects passed through the ordeal scathless. The strangest and most paradoxical results have been noted. Important lessons follow. At Drummondville, we learned that the mulching of the tender varieties of the peach had preserved them. In fact, the severity of last winter has abundantly taught the beneficial results of mulching. Trees well mulched suffered comparatively little—left exposed, they scarcely survived. The practice of mulching must soon become general, and this both in winter and in summer. In winter it is needed to protect against the withering cold, in summer as a shelter against the intense heat. My own experience is strikingly illustrative of the benefits of mulching. For years I mulched either with manure or turf—for the last two years I have applied fertilizers in both cases on the surface. During the past summer and spring branch after branch of my beautiful and fruitful pear trees have gone. My occupation has largely been to

trim off great quantities of blighted limbs, and the evil, I fear, is not over yet. I propose to return to my old mode of culture, and mulch both in winter and in summer.

In a part of my front green, I have purposely kept the ground free of weeds and grass. Every tree on this particular plot has suffered; my pear trees have actually died out, and my apples have greatly suffered. I intend in the spring to sow grass seed or clover to protect the roots of my trees. After all, there is something in this grass theory and practice. I am satisfied that a good crop of weeds has something to do with a good growth of wood, and with the fertility of fruit-bearing trees. Some manure which I once employed as a top dressing was full of groundsel seed. A luxuriant crop of what was esteemed a noxious weed was the consequence. Not a single bough, however, blighted, notwithstanding the luxuriance. Thinking it proper and right, I got rid of the groundsel, and have for these two years kept my ground clean, but undug. This tidiness on my part has been further carried out by an orderly and painstaking workman, who raked into heaps every bit of bark, bone, pruning, old shoes, rags, &c., which offered a certain kind of mulch, and thereby left the ground bare and clean. The result, come from what cause it may, has satisfied me that trees like a little roughness. Forests mulch themselves. Mr. Saunders, of London, can tell a somewhat similar tale, or rather his grounds do if he won't. Having recently visited his fruit farm, I can testify that even a grass mulch is unmistakably beneficial, and highly subserves the interest of the horticulturist. Among trees on cultivated land, there is at London a very high percentage of deaths; in the same varieties grown under grass in the same, nay almost the immediate position, the percentage of deaths is not a tithe. This speaks volumes for mulching. Indeed, mulching is a great necessity. At Ottawa, in June last, I noticed in Mr. Bucke's garden that the canes of his raspberries were scarcely touched; in attempting to account for this I found that he had been attending to first principles, and that his vines were and had been growing under a course of very heavy manuring.

It matters little what the kind of mulch is, so that it prevents rapid evaporation; grass prevents evaporation, and seems beneficial to the roots of plants—it acts, in fact, as a cooler.

Much of the destruction of fruit trees during the past season has been, I am fully persuaded, from the effects of the SECOND winter which we had in the spring. A very severe second winter occurred in the month of April, and a trying frost on the 15th and 16th of June. The black winter in April did a wonderful amount of mischief. We believe it to be incalculable. The sap had made a start after the first thawing of the snow —when the thaw had bared the earth, then a black frost succeeded, which tried every plant that had already started. The roots suffered much, and in some instances the frost killed the vitality outright.

The great havoc made among fruit and other trees, however, during the spring, arose from another cause. The dry frost was succeeded by a track of dry weather, which completed what the cold had left undone. This season I notice that the boughs are more limber than I ever saw them—more bending under the weight of fruit, which I attribute in great measure to the same cause. The drought was so severe and continued, that farmers and others were afraid of their crops, and even feared the failure of their harvest, forgetful of the promise made in the olden time, that "while the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter, and day and night, shall not cease."

We believe that this cold and drought has brought about a new variety of blight. The blight of former times has almost disappeared, and has been succeeded by what may be called a DRY BLIGHT. This new disease, if new, has none or few of the characteristics of the old sort. The smell of the fermentation is not so strong; the bark is dry, without the former acrid liquid and scent. A diagnosis of the disease brings one to conclude that the two are different. One particularly ought to be mentioned: the death of the trees could not be traced till after the drought, though we are perfectly persuaded that death was the result of the frost.

At our meeting in Drummondville, various theories were broached, all, however, being less or more uncertain on account of the want of well-ascertained facts to back them. It is evident that a remedy for this state of things is only to be found in hybrid improvement.

We have noticed that good hybrids are less liable to be attacked with blight than

imported varieties. Crosses are yet to be made which will combine hardihood with quality. Our hybridists are on the track. Skill and delicate manipulation will yet accomplish their wonders. We are only on the threshold of great discoveries in hybridization. Facts are becoming more and more patent which show the wonderful influence of the stock upon the scion. Stock ought to be selected with the greatest care. That any stock will suffice is an idea that happily is becoming exploded among fruit growers. Were testimony to be desired as to the effect the stock has upon the scion, it is not wanting to those who have noted the disastrous results of the past winter. Take, for example, the cherry. Cherries worked on the mazzard stock have in most cases been killed outright, while those on the mahaleb, standing in close juxta-position, have in many instances escaped. The mazzard cannot be compared to the mahaleb as a stock. Were growers to order trees on the mahaleb stock they would not suffer so severely as they have done from the severity of winter. Mr. Saunders' cherries, on his farm in the neighbourhood of London, have almost all suffered that were on the mazzard; those on the mahaleb, while showing symptoms of having suffered, are comparatively uninjured contrasted with those on the mazzard. What is true of the cherry on mahaleb and mazzard stock is equally true of pear stock. Some varieties of stock are naturally dwarfish of themselves—in their own nature—and some are rampant growers. These differences are to be found in the smallest quantities of pear stock. I have a Lawrence on pear stock, which has the diameter of the stock double that of the scion. The consequence both of the growth of the wood and of the fruit is that it far exceeds its neighbours both in wood-growth and in fertility.

This question of stock must soon assume proportions which have not characterized its importance in the past. Few pears are so tender as the apricot. The smallest and tenderest twigs of my apricots were untouched by the frosts of the past winter, while all over my garden, hardy and tender varieties of the pear alike have been greatly injured, and this, in many instances, owing to the stock. Good stock cannot be got by haphazard—by taking just what comes up from the pomace as sown by our nurserymen. The varieties arising from the seed of the same apple are as different in nature and constitution as the individual plants differ from one another. What we desiderate is that the best selection is made of the best varieties, and only such used as stocks for our future trees. Indeed, we are persuaded that the choice of the plumpest and best seeds would accomplish a good purpose; choice of good seed will, as a rule, secure good stocks.

We have reason, however, to congratulate our members that the severity of the winter is not an unmixed evil. While it has played havoc among our trees and plants, it has not spared some of our worst insect pests. The curculio has come under its ban, and the number of the little Turk have greatly diminished. In spring I began to jar when the buds were fully developed. Beginning with three, we never captured at one time more than seven from any one tree. We venture to think that they were bagged before they had copulated. The early harvesting of the few prevented much trouble with the many. The winter has really loosened this evil. The curculio has not made his usual ravages, and the Owen Sounders may be safe from his ravages for years to come. What is true of the curculio is more than true of the pear slug. Not one has been observed in my garden this season. It is difficult always to give the reason of things, but it seems to us a matter of fact that the winter has had the effect of cutting off this pest.

We ought to be careful in wishing ill to anybody or anything, but we cannot avoid wishing that similar effects had resulted in the case of the codlin moth as have affected the curculio and pear slug. The ravages of the codlin moth are as great this year as I have ever known them. Early in the season there was a fair promise of a good apple crop, but the ravages of the codlin moth have thinned the trees considerably, and the apple crop on the whole can scarcely be said to be up to the medium. One united effort must be made by all fruit growers to gather the fallen fruit. We have considerable faith in rolls of rags, both of cotton and paper, about the trunk of the trees to catch the larvæ, but much can be done by collecting and destroying the fallen fruit. Mr. Springer, Wellington Square, uses with great success, for the diminishing of the codlin moth, strips of coarse saltpetre bags fastened with a spike of the common Canadian thorn tree, and finds it completely successful. He has saved his crop of Northern Spies, and is almost free of the enemy, being aided by the acute sense of hearing, and by the good taste of his porkers. Once a week a visit is paid to the bands, and the numerous occupants are prevented from

doing further mischief. Such we believe to be a fair resumé of the fruit interests in Ontario during the past season. It will be found to be pretty correct as applied to our fruit-bearing districts. It only remains to be added that on the whole the fruit crop is good. Although apple and pear and even plum and cherry trees have suffered, there is in general a good crop throughout the country. The yield of small fruits has been immense. The drought somewhat affected the strawberry crop, but the seasonable rains insured an abundant yield. Blackberries, in favoured and sheltered localities, have done well, and cultivators, as a rule, have had little reason to complain. Currants and gooseberries have been singularly prolific.

It would be well, perhaps, for the reputation of your President, as regards his horticultural knowledge, that he should here call halt ! in his annual address. Unfortunately, however, for him, something more is expected, and he has only at this stage approached the subject matter of his address. After casting about in various directions, and throwing himself on the kind offices of friends, especially upon the considerate promptings of Mr. Saunders and Mr. Arnold, I have concluded to speak to you a little *on the cultivation of the smaller fruits, and on the steady onward progress being made in their improvement.*

It is said that a word aptly spoken is good. It may be that the subject of small fruits and the locality where we are met, are suited to each other. For while it must be allowed that the rich and luscious fruits of the west are not well adapted for this region, yet in the cultivation of the small fruits, the Ottawa Valley is not to be beat. Indeed we question if finer raspberries, currants and gooseberries can be found under better cultivation, or anywhere yield a better result, than in Mr. Bucke's garden in the City of Ottawa.

THE STRAWBERRY.

One of the standard questions at our annual horticultural meetings is, "Which is the best variety of strawberry ?" For many years past the almost uniform answer has been, from skilled and unskilled, "Why, the 'Wilson's Albany.'" Taken as a whole, perhaps it is the most profitable berry for market and amateur cultivation, but wonderful strides are being made in approaching, if not in transcending its excellence. We do not now speak of any of the best known and most commonly cultivated varieties, but of the famous sorts being introduced by our hybridists. In flavour and quality many of the new varieties excel the Wilson's Albany.

The best mode of cultivating the strawberry is one of our vexed horticultural queries. We are persuaded that there is only one road to be travelled in this culture. The ground must be carefully prepared—we mean enriched and cleaned. The plant delights in a pretty heavy clay loam. A sharp soil with abundance of lime is singularly suitable for their successful cultivation. A common mode of cultivation is to plant, and leave the plants to care for themselves, take two or at most three crops, then plough them down, and then replant. The system is vicious. Strawberries to bear well should be differently treated from those from which you desire to propagate. These should be allowed to throw out all the runners of which they are capable. Fruit-bearing vines should have every runner nipped off, and the stock plant only allowed to bear without a single runner. This mode of cultivation was finely shown by Mr. Biggar's treatment at Drummondville, in the culture he gives his seedling, the New Dominion, and indeed to the Wilson's Albany, and to all his fruit-bearing varieties.

Winter protection is absolutely essential. Different substances have been used for this purpose, but we believe the kind from which the berry derives its name is the best—a straw protection. Mr. Arnold last winter tried wood shavings, and in the former part of the season, during and after the snow had fallen, they did well; but when the black spring frost came they dried and were driven away by the wind—at the very time they were most needed they were found wanting. Straw, after all, is best adapted to the cultivation and protection of this variety of fruit. What we desire to see is the plants and interstices between the rows covered with this mulch, and the plants in spring allowed to grow through the straw. Many growers winter cover the plants and rake off the protection in the spring. What is wanted is a clean seedless mulch for the spring and the warm weather, and nothing affords this so well as good clean straw. The plant seeks sustenance deep in the ground, and man's efforts should be made to assist nature. Pro-

tection is as much needed in the dry weather as in the cold. Last summer there was a great outcry that the dry weather would cut the crop short, and so it did ; but what we ask is that the horticulturist should so cultivate as to reduce the uncertainties of the weather to a dead certainty as regards the yield. Protection would go far to remove the uncertainty.

We have said that new varieties are successfully competing with the old and valuable varieties. Our hybridists are making wonderful inroads upon old-established notions. Arnold's No. 1, which has been shown year after year at our spring meetings ever since we met at Chatham, has been gradually gaining the confidence of our strawberry connoisseurs. It has indeed a delicious flavour—the highest flavoured berry with which I am acquainted—the highest flavour, we think, of any cultivated variety. Its size, too, is greatly above mediocrity, in fact is enormous, and the plant is a marvel of prolificness. We augur for this new claimant on public favour an immense success. It is not altogether apart from the object of this paper and of the present meeting to say that Mr. Charles Arnold, our premier hybridist, has over a thousand distinct hybridized varieties of strawberries.

In point of excellence, at no great distance behind Mr. Arnold's No. 1 comes Mr. C. H. Biggar's new variety, "The New Dominion." It has been successfully shown for two seasons. It came through the late trying severe winter scathless, and has been proved to be a variety of great hardiness. We would strongly urge upon the members of our Association, that in due time both Mr. Arnold's and Mr. Biggar's strawberries should be disseminated over the length and breadth of our Province. It not unfrequently happens that new varieties do well from home, and we are certain that both sorts would take kindly to the soil in the Ottawa Valley, and give an ample return to any extra kindness shown them by our horticultural friends around the capital.

RED AND BLACK CURRANTS.

Somebody has said that currants and gooseberries are the poor man's fruits, and so they are. There is no long time lost in waiting for their fruiting,—and along with no delay, there is little loss from mildew, cold or heat, drought or wet. They are a yearly crop, almost always to be depended on for a prolific return. The mode of cultivation is easy, and every man may become his own gardener. The red currant in its pruning requires to be switched up very much in the fashion of trimming a privet hedge ; the black should never be topped, but thinned out, and the young wood carefully preserved. We must repeat, too, our caution about mulching. Currants mulched will produce fully a third more than when left exposed—this, too, we mean both in winter and summer. The plant itself is a sort of protection to itself, but as its roots are not deep in the ground, there is the greatest need of continued mulching. Short, well-rotted barn-yard manure is the best mulch that can be applied to the currant. We have used with success the scrapings from the firewood heap—chips have a roughness and dampness about them that to the plant is very refreshing.

Certain improvements have been made in currants which ought not to be overlooked—of late years the cherry or grape currant has come into very general cultivation. The size is often something extraordinary, though we would whisper in the presence of currant growers, that the size has been cultivated somewhat at the expense of the *recherche* in flavour.

In the market, however, the grape currant has a wonderful demand ; this on the principle, we suppose, that as a rule people like a large mouthful.

Mr. Dougall, of Windsor, has some fine seedling currants. We have for some years cultivated six or eight new varieties of his. With one of these we are especially pleased—it combines almost the size of the grape currant with all the richness of flavour of the best Dutch varieties.

Mr. Saunders, of London, has a hybrid, a very fine black variety, which for size and flavour exceeds any variety with which we are acquainted. We can only quote the words of one of our veteran horticulturists in regard to it, and say that in respect of flavour, size, foliage and health, it surpasses by far any known variety of black currant. This particular one of which I speak is only one of several successfully raised by Mr. Saunders. We have only to add that the price of black currants ought to secure a larger competition in our markets than it has yet done. There are few fruits more wholesome, few more easily preserved for

winter use, and few more agreeable to the palate in the sick room. Its cultivation will amply remunerate the grower. A friend in the neighbourhood of Hamilton this season secured from a few small rows of red currants the enormous sum of fifty dollars currency. The cultivation of currants, red, white and black, is singularly adapted for Ottawa and the surrounding country. There is an old adage which says, " He that gives quickly, gives twice," This is especially true of currant culture : the return is at once—it is quick and continuous.

RASPBERRIES AND BLACKBERRIES.

Here is a wide field for remark and full scope for self-defence on the part of your President to shorten what he has to say on this important and lucrative cultivation.

The cultivation of raspberries has made wonderful progress in the course of a few years —what greater could have been made in the cultivation of almost any fruit than has been made in that of raspberry culture ?

We fear that this district is somewhat in the position in which more western localities were a few years ago, viz., so overrun with the natural sorts that there is almost no need of cultivating the fine varieties. It is a wonderful damper to a grower of raspberries to be told that an Indian is at the door offering a patent pail full of beautiful fresh raspberries for 25 or 30 cents. It is a great temptation, under such circumstances, that no further investment shall be made in raspberries. This state of things here and elsewhere has militated against the vigorous cultivation of the raspberry.

Raspberry culture, however, is remunerative—highly remunerative. This, like many other varieties of fruit, requires continual planting. In fact, transplanting is an absolute necessity. We know of few varieties of fruit cultivation that will more amply repay care and attention than the raspberry. Both in the field and garden it requires to be kept clean. Indeed, this is true of all cultivation. The benefits of mulching are evident in the cultivation of the raspberry, although we have seen it overdone. If the mulching is too heavy at, or immediately after the fruit is ripe, it is apt to stimulate to an immature growth in the fall, which often leads to disastrous consequences, in this way, that the unripened canes, which under such circumstances often push to a great length, are unfit to withstand the severity of the winter. Heeling up with the plough immediately after the fruit is gathered, or a shallow furrow with the cultivator, lets the drought into the land, curbs the growth, and tends to stiffen the canes.

The Philadelphia holds much the same relation to raspberries, as Wilson's Albany does among strawberries. It has been the favourite for years, both for its hardiness and prolificness—it is singularly prolific. During the past year it has suffered much in common with almost all varieties of raspberries. At Drummondville the fact was established, that, account for it as we may, the old-established hardy varieties suffered more than acknowledged tender varieties. The Hornet, a tender variety, suffered less from winter-kill than the Philadelphia. Last season was, however, in its effect an exceptional one.

Seedling hybrids are springing up in various sections of the Province, which threaten to rival this old favoured variety, the Philadelphia. Colonel McGill, of Oshawa, has a good seedling variety, though tender, and a little soft for marketing. The same remark may be made with regard to many samples of seedlings that have been sent to your President from various districts.

Two hybridists, however, in this department maintain the credit of their already wide reputation. We allude to the efforts of Arnold and Saunders in this field of hybrid cultivation. In visiting Arnold's grounds during the past summer,we were struck with admiration at several of his results in hybridization. Our memory, without being refreshed by notes, takes us back to his No. 7, a handsome, highly flavoured, red berry—an excellent grower, with singularly coarse bright foliage. Had a mortal like myself raised one such variety, I should never cease to blow my horn, which I sometimes try to do without having produced anything ; but when I mention that Charles Arnold has six or seven as good, which bore during the past summer, and a multitude whose name is legion yet to be tried, I think your admiration will be awakened at the persevering and patriotic efforts of our old esteemed director and hybridist.

I may, perhaps, be permitted to propound a question to the curious and philosophic among you, how it comes that from the stem of one of Arnold's white raspberry hybrids,

there springs the limb or bough of a red raspberry? Like the propounding of a conundrum in a periodical or magazine, I'll allow the question to lie and ferment in the brain of any one of you for a year, and I shall expect a reply this time next year at our anniversary.

All other efforts at hybridizing the raspberry, however, fall short of the essays of Mr. William Saunders, of London, who has not simply hybridized one raspberry with another, but who has succeeded in producing an entirely new fruit by crossing the raspberry with one of the black cap family. His success has been remarkable, and to no one perhaps more so than to himself. He has introduced to fruit-growers a fruit sharing in all the characteristics of the raspberry and black cap alike. His hybrids Nos. 69 and 70, which are reported on in 1873, have already been described, and the description will amply repay perusual by any of our members. Those, with other numbers, have all the prolificness of the Philadelphia and all the piquant flavour of the Black-cap combined.

It will afford pleasure to the members of the Association to learn that the Directors have agreed to send out shortly over the length and breadth of the land those superb triumphs of modern art. Their dessert and baking qualities have been equally tried, and in both respects they are excellent.

I could not conclude my notice of the progress of fruit-growing during the past year without expressing my unqualified admiration and pride that a member of our own Association has achieved a success that places his name foremost among Canadian hybridists. Surely this is the man whom the Association will delight to honour by placing in the President's chair this year.

BLACKBERRY.

The varieties successfully cultivated have been the Lawton, Kittatinny, Wilson's Early and Sable Queen. From one cause or other these fruits have not yet attained that place in public favour which their excellence would have led us to conclude would have been the result of their introduction and cultivation.

We have not noticed the insect pests that prevailed to the great detriment of fruit and fruit growers. This is not because our subject does not lead to such discussion, but because all needed information can be got in the essays on the subject that have already appeared from our entomologists in the past records of our acts and proceedings.

GOOSEBERRIES.

In regard to the cultivation of gooseberries, however, it must be said that growers are sadly checkmated by various prevalent pests. Foremost among these is mildew. We enter into no philosophical discussions about the origin and nature of this evil. Suffice it to say, that we are persuaded that many portions of our Province are out of the latitude of gooseberry growing. We are too far south for their profitable culture, being on the border land between gooseberry growing on the north and vine growing on the south. Wherever hardy grapes can be grown successfully, there gooseberry culture is a failure.

In most parts of Ontario, European varieties may be said to fail us. By continuing to plant young trees, fruit may be raised free from mildew for a year or two, but too soon the evil comes. The third year may be said to be the extent of successful gooseberry culture. Houghton's and Downing's seedlings have rendered it possible to preserve the flavour of the gooseberry, but after all it is only a tantalizing of one's appetite to attempt to satisfy the craving for gooseberrles with any quantity of the Lilliputian berries of Houghton or Downing's seedling.

Mr. George Elliott, of Guelph, has a fine chance seedling, which is of excellent flavour and good promise.

Mr. James Dougall, of Windsor, cultivates some promising seedlings, in point of size and flavour ahead of Downing somewhat.

Mr. William Stokes, of Mooretown, has raised a valuable seedling. Mr. Peter Murray says of it, "It approaches the strain of the Lancashire and Scottish varieties more closely than I have ever seen in Canada."

Mr. William Saunders, of London, distances with his hybrids all competitors. In the report of the F. G. A. of Ontario, for 1873, the following sentence occurs in relation to Mr. Saunders' hybrid gooseberries: "We found in the rows of gooseberries an almost indefinite

number of hybrids, exhibiting almost every characteristic of colour of fruit, variety of wood-growth, fruitfulness and barrenness." This summer we again examined his plants, and found that notwithstanding the severity of the past winter and the extraordinary drought of the spring, they amply bore out all the eulogiums that were passed on them by the Committee in 1873.

Nos. 6, 11, 17, 19, 21, 24, 26, 31, 33 and a few others are among Mr. Saunders' most promising varieties.

We are ashamed to detain you longer. Pardon me, however, if I return to a favourite subject with me, and one which is singularly adapted to benefit the Ottawa district. We mean the cultivation of the cranberry.

THE CRANBERRY.

The cultivation of the cranberry requires a sandy light soil, with sufficient command of water to cover the plants for a fortnight at a certain season in spring with a foot or two feet of water. This fruit is becoming quite a commercial commodity, largely used for culinary purposes both in America and England. A swampy, mucky soil, or old beaver meadow, is well adapted for its cultivation. It will amply reward its patient and persevering cultivator. Plants of the best variety can be readily procured from Wisconsin, and that at a cheap rate. We commend cranberry culture to those of our friends in this district who may have a suitable location.

THE MULBERRY.

We have tried two varieties of mulberry, the purple and the white. They do well in and around Hamilton. One season, through the kindness of Professor George Lawson, we had cocoons of the silk worm from the north of Italy, and tried the raising of silk. The larvæ not having been sufficiently protected from the birds, we got our labour for our pains, and are therefore unable to speak satisfactorily of the result of a trial of a culture that may yet be of commercial importance to our Province.

GRAPE HYBRIDS.

I have in one brief sentence to notice the success of hybridizing the grape, so successfully practised in Ontario during the past few years.

Mr. P. C. Dempsey writes me that his hybrid, the "Burnet," named out of compliment to your President, is fully a week or ten days earlier than any variety grown on his grounds.

Mr. Haskins' Congener to that of Mr. P. C. Dempsey, both having the same parentage, is this season doing well, having an abundant crop, ripening fast and giving promise of something good.

From a recent visit to the garden of Mr. W. H. Mills, Hamilton, we are in a position to affirm great things in regard to three or four of his hybrids. Of one we may with confidence speak, and say, that he has produced an early hardy grape, which, for flavour, will successfully compete with the Ottonell, or with any other equally highly flavoured grape grown under glass.

We anticipate a successful run on these fine hybrids; we cannot but express our delight that after years of anxiety and care and forethought, he is not unlikely to be rewarded for all his attention and labour. Let me ring a warning note in regard to the future. The year on which we have entered is to be signalized by the Centennial Exhibition at Philadelphia, in 1876. It is a matter of regret that, as an Association, we have taken no part in the meeting of the Pomological Society of the United States, held a few days ago in Chicago. Double energy must be used to put in a creditable appearance at Philadelphia. We are, simply for the honour attached, competing with the wise and pushing horticulturists of the neighbouring Republic; let us enter the lists with the determination to excel; there is no fear of want of success. Our apples, plums and hardy grapes will compete with those of any locality on the continent. Let unanimity prevail in our councils, and there is no fear in my mind as regards the issue. We must try to rival our own agricultural and arts' interests. Determined steps are being made, and plans laid by our fellow-citizens for the successful carrying out of their competitive views at Philadelphia. We cannot afford to play a second—an inferior part. A united pull, a pull altogether, and North America, with the Islands of the Sea, Europe and

every Colonial dependency, will ring with our achievements. Boston in 1873 must be outstripped; our unlooked-for successes there must be made to induce to greater efforts for 1876.

Members of the Fruit Growers' Association of Ontario, my annual address is ended. I thank you for the patience with which you have, as usual, received my thoughts. I consider it a very proud distinction to have so often obtained your suffrages in placing me in this chair. I shall gratefully remember your courtesy and kindness while memory retains her seat, and shall always cherish the fast and true friendship which has been formed in connection with your Association. Such remembrances will be chastened, it is true, by the thought of the little I have been able to do for the advancement of the horticultural interests of our country, so dear to you. I purpose to show you how much I appreciate your consideration by endeavouring to further, in every possible way, the objects for which your Association was established, and for which it continues to exist. Let us, by continued, accurate and matter of fact observation—by the wise and sober discussion of controverted questions—by the free and unselfish interchange of thought—by careful and judicious generalizations in hybridization, strive to attain that eminence and importance in the prosecution of our horticultural interests, which will render horticulture only second to the premier, and therefore paramount interest in our country—agriculture.

ROBERT BURNET.

REPORTS OF DISCUSSIONS.

WINTER MEETING.

The Fruit Growers' Association of Ontario held their winter meeting in the City Council Chamber, Hamilton, on the 11th February, 1874.

The President, Rev. Robert Burnet, took the Chair.

There was a very large attendance from many parts of the Province—from Owen Sound, Toronto, Drummondville, Grimsby, St. George, Harrisburg, Lynden, Paris, Winona, Jordan, Woodstock, Nelson, Linden, Aldershot, Wellington Square, Ancaster, Galt, St. Catharine, Brantford, Falkirk; and Rochester, New York.

After the Secretary had read the minutes of the autumn meeting, held at Ottawa on the 8th and 9th September, 1874, and also those of the meeting held in Toronto on the 22nd of September, 1874, the meeting proceeded to business and appointed the following Committee to prepare subjects for discussion, viz:—

Mr. Arnold, chairman; Judge McPherson, Messrs. Leslie and Smith.

Messrs. Wm. Hill, Woolverton and Durkee were appointed a committee on seedling fruits.

The President introduced Mr. Jones, of Rochester, a representative from the Fruit Growers' Association of Western New York, who was cordially welcomed by the President, and invited to take a seat on the platform.

An interesting discussion was then commenced by the President on the subject of "How can the fertility of large orchards be most economically maintained?"

Mr. Burnet said the best way of continuing the fertility of orchards was to keep stirring the soil, and while the trees were young good manure should be applied; but when the trees are older, leached and unleached ashes should be applied, carbolic acid, oxygen and especially ammonia. He said that it would be well to "whip" the trees—that is, to thin the blossoms, so that the fruit will be large.

Dr. Cross said that the limbs of old trees should be kept well thinned. He thought that carbonaceous manures, such as chip manure and sawdust, would be beneficial to old orchards.

Mr. Allen Moyer, of Jordan, said that black muck from the creek bottoms, applied as a mulch, was good. He said that it was not well to force trees with strong barnyard manure.

Mr. Bowslaugh said he used strong barnyard manure in his orchard, but his soil was very sandy.

Mr. Geo. Leslie said his course was simply to give the land annually a light ploughing, to keep the weeds down, and once and a while a sprinkling with lime, and as often as possible a sprinkling with ashes; he also scraped his trees.

Mr. Culham, of Milton—I always wash my trees with soft soap, and scrape them with a hoe; we always gather the fallen fruit. He approved of scraping them thoroughly—it keeps the borer and lice away; ashes should also be used. Our soil is yellowish loam.

Mr. Newton, of Woodstock, approved of keeping lots of ashes in the garden; he had no black knots in his pear trees in consequence; used all the leached ashes he could get, keeping the soil always stirred.

Mr. Cornell advocated the ashes question. He did not think it was good to scrape the bark off young trees, as it gives the sun a chance of scorching them.

Mr. Caldwell said it was the best to prune from the first, for if a tree is once neglected, then it can never again be got into shape. He advocated the pruning of trees when the leaves are fully out, as the wound then commences to mend immediately. He said trees should not be pruned in winter, as they bleed and freeze. He thought also that, both in animals and vegetables, cleanliness was of the first importance; therefore, always clean off the moss and old bark. He said that the tree should be scraped and washed, and the bark opened with the point of a knife. I apply ashes and swamp muck to the roots of my trees. Mr. C. was of the opinion that the American trees imported into this country, were of little use to Canada, where the mercury sinks to thirty degrees below zero, as they had all been raised in hot-beds, and he thought that a tree should be made hardy from the beginning.

Mr. McKay applies barnyard manure to his trees. There was a seedling apple on the table raised by him.

Mr. Burt says that the trees should be scraped after a rain, as the bark was softer.

Mr. Woolverton, of Grimsby, said that some of his trees were seventy-five years old, and yet they bore well; he keeps the trees well thinned. He said that he had a young orchard of two hundred Northern Spy. He said that trying to dwarf the trees caused the suckers to grow. He uses all the ashes he can get. He plants dwarf pears and peaches between the larger trees. In regard to scraping trees, he suggested that they began in the wrong place, as the presence of the moss was a proof of the unhealthy state of the tree; also that there was, as a rule, too much pruning done. He strongly advocated ashes, and did not think that crops should be cultivated.

The Rev. Dr. Read said he spoke as an amateur gardener, and could not offer any valuable suggestions; but thought that pruning too early was a great mistake, and that a tree pruned after it was in leaf did better than one pruned before. He thought that scraping and washing the trees was beneficial; that turning pigs into an orchard helped to destroy the insects; that some trees require more iron than others—one of these was the pear tree; iron should be applied to this tree.

Mr. Jones, of Rochester, said that this subject was one which interested the whole of the fruit-growing community. When this theme was brought up at Rochester it was introduced by a man who advocated that nothing but animal matter would do for orchards, but this was proven to him to be a mistake. Land generally had naturally an inexhaustible amount of fertility, and all that was wanted was to bring it out. Mr. Jones thought that with all due deference to Canadian trees, if he were getting young trees he would prefer sending to Louisiana for them, rather than to the northern part of Canada, as they have ripened wood every fall. He trims his trees all winter, and crops his orchard with root crops. His idea of pruning was to commence young, and be very careful about it. He prunes in winter for wood, and in the summer for fruit. An apple tree never bleeds unless it is diseased, especially black-hearted. He applies his compost in the fall, the frost sweetens it, and the spring rains wash it to the roots. As regards pruning, never use anything but a knife; begin young, and keep your trees in shape.

Mr. Saunders spoke respecting the economy of manuring, and stated that he would have to pay fifty cents a load for stable manure, whereas he could get ashes for fifteen cents a load. Which was the better of the two he could not say. He applies gas lime to the soil to prevent worms in fruit. He crops with buckwheat and clover, and ploughs it in.

Mr. Charles Lee believed that the first thing to be done was to prepare the ground rightly before planting your trees. He thought that Greenings were the best apple to raise.

Mr. Anderson found by experience that he had pruned too severely, and in case of trees getting decayed had used gas lime, but not in too large quantities.

Mr. Arnold thought that Mr. Leslie had put the whole argument in a nut-shell, viz., cultivate the soil, feed the soil and keep the tree clean. He keeps all the ashes. He also places large pieces of soap in the crotches of his trees, which melt with the heat and rain, and run over the trunk of the tree and prevent insects.

Mr. Murray, who had charge of the Marquis of Breadalbane's garden for thirty-five years, spoke more respecting Old Country cultivation, and approved of early pruning and keeping trees small. Does not approve of the cutting of large branches of trees, especially in stone fruits. He approves of keeping apple trees low and flat.

Mr. Charles Lee said that he had raised an orchard, and about apples he said it was well to prepare the soil. He puts stones under the centre of his trees to prevent them from sending down tap roots. He takes out the subsoil and replaces it with top soil. He doesn't allow people to climb into his trees with hard boots on, as it bruises them. He would plant nothing but Greenings, though the Northern Spy does well with him. He washes his trees in the spring after pruning them.

Mr. Anderson said that where an orchard had been neglected it is not well to prune too severely.

Mr. Graham thought that the great secret of success in an old orchard was to keep the trees clean, and free from lice.

The President remarked, concerning scraping, that he had noticed if trees were not scraped there was no blight upon them, and thought that bark was given as a protection to the trees.

Mr. Cornell, of Lynden, said that he did not think that it was caused by insects, but by atmospherical changes.

Mr. Saunders, before adjournment, begged to propose a resolution, which was seconded by Mr. Arnold.

The President, in a few very appropriate remarks, put the resolution, which was unanimously carried, and was as follows:

"That the officers and members of this Association have learned with deep regret of the sad accident which resulted in the death of one of our esteemed Directors, Mr. John Gray, of Toronto, and while deploring our own loss in the sudden removal from among us of one of our most active and valued fellow-labourers, would tender to his bereaved family, in their affliction, our heartfelt sympathy." The Secretary was requested to transmit a copy of the above to the bereaved family.

The Committee nominated to provide subjects for discussion proposed the following:

1. To decide on the legal size of apple barrels, and petition the Legislature.

2. What trees can be recommended as best for shelter for an orchard, and how should they be planted?

3. Hardy Grapes: are they a profitable market crop, and what varieties?

4. Can unity of action be secured among fruit-growers for the destruction of the codlin moth, and what can be recommended?

5. What are the most suitable trees for planting country roads, streets, etc., and should they be planted in single or double rows? Should the sort be mixed or not to produce the best effect?

6. Are small fruits profitable crops for market purposes, and what varieties are best for succession in ripening?

The President invited all the members to tea at the manse in the evening, and the meeting adjourned till 2.30 p.m.

The adjourned meeting of the Fruit Growers' Association was called to order by the President at 3 p.m.

Mr. Fearman showed some magnificent specimens of out-door grapes, grown by himself, of the variety known as "Rogers' No. 15," a red grape; also Nos. 19 and 4, of the same species; also some of the Diana kind.

Mr. Wm. Hill produced some fine apples, named "Cooper's Market."

Mr. Allen Moyer, of Jordan, exhibited two varieties of seedling apples; and Mr. S. Woodley, of Hamilton, came to the front with his No. 4 Rogers' grapes.

Several additional members were present, and the subject brought before the meeting was, "Hardy Grapes: are they a profitable market crop or not?"

Mr. Holton thought that the most profitable grape in the country was the Concord: he also had a high opinion of Rogers' Nos. 4, 9, 19 and the Salem, all of which were early and productive. The Delaware, too, was a good grape. He had noticed, as well, some seedlings grown by Mr. W. H. Mills, both red and black, as showing promise of an excellent grape. The greatest importance here is to get grapes that will ripen well. He thought Rogers' No 15 a little uncertain as regards ripening.

The President asked Mr. Holton whether he could give him any information concerning the Iiler.

Mr. Haskins made some remarks on seedlings.

Mr. Caldwell stated that the culture of grapes in the North was rapidly extending. He considered the Concord to be the best grape.

Mr. Macallum had found grapes very profitable for home consumption. The Concord was no doubt the earliest grape, but he considered the Delaware could always hold its own. The Creveling was, however, his favourite. This grape he had got from the Association, and he was pleased to say that whatever he had got from the Association had turned out well.

Mr. Woodley thought that the Creveling grape was earlier and better than the Concord. He said that when the Concord was grown near the Creveling it helped to set the fruit of both.

Mr. Lee preferred the Concord, as it wanted less cultivation and ripened earlier. The best grape to keep, he thought, was the Tokalon. Regarding early grapes, the Adirondac and the Hartford Prolific were, in his experience, the best. He did not think that raising grapes was a good speculation, and would prefer for market purposes raising other fruit.

Mr. Haskins agreed with Mr. Lee in his opinion of grapes not being a profitable market crop, as he thought the market was overstocked. The Concord seemed to be the most popular grape, but he preferred the Delaware and Iona. Of the Rogers' variety he considered Nos. 3, 4 and 9 were the best. There was always great difficulty in keeping grapes.

Mr. Fearman knew nothing about the market purposes of grapes; his favourite quality was Rogers' No. 3. No. 15 of same kind ripens late, and in consequence is able to obtain a good price when other grapes are out of season. He did not think that grapes were used sufficiently for household purposes; they were a healthy and nutritious food, and might be used in puddings and other ways. Perhaps using them to make wine was the most disadvantageous manner it was possible to employ them for. He had always defended his grapes from mildew by using sulphur. Rogers' No. 4 is a black grape and very hardy. He grew No. 15 on hop poles; it ripens late. When he put them by this fall they were hard and sour, but now they are tender and sweet. He says that the grape is not used sufficiently. They can be grown with great pleasure and profit. He kept his in wooden boxes, in layers, with newspapers between them. His favourites are No. 3 in summer, and Nos. 4, 9, and 15 in the autumn. The Isabella kill every winter. The Allen hybrid is good, but should be laid down every winter. It should, when the fruit is as large as a pea, be dusted with sulphur.

Mr. Jones, Rochester, said, regarding the marketable profit of grapes, he had some experience, having sent grapes all last season from Rochester to Montreal and other places in Canada, when, after paying duty and other expenses, he found them to pay well. In Rochester he cultivated three acres of grapes of the Hartford, Delaware and Concord kind, also a few Isabellas; these grapes he sold for three cents a pound, and made a profit of $300 an acre, which he considered was a proof that there was money in grapes. The earliest grape he knew was one at Rochester called the Champion, or Tolman seedling, something like the Concord, but fully a week earlier than the Hartford, and ten days before the Concord. Regarding the market value of grapes, make the price of them low and people will get so used to them that they will feel obliged to buy them, and then when the public begin to feel they are a necessity, you can raise the price. He had found no difficulty in keeping grapes, only be careful when packing them to see that no stem is broken; place them in baskets with layers of paper between each bunch, and hang them in the cellar. He had found the Hartford and Delaware the more profitable. He used to think it a difficult matter to keep grapes, but thought differently now; picked his grapes in the sun when they were perfectly dry, in a market basket, and they kept as well as potatoes.

The President had tried the Champion, or Tolman seedling, and had found out (at least the boys outside had) that they were the earliest grape known.

Col. McGill (Oshawa) said that in his neighbourhood Rogers' 3 and 15 were the favourites, and sold well at 10 cents a pound. They found that the Isabella did not ripen well. A friend of his sold Delaware at 10 cents a pound. The Concord and Rogers' Nos. 3, 4, 9 and 15 did good.

Mr. Anderson said that the Concord was the best grape.

Mr. Newton, Woodstock, said that Rogers' Nos. 3 and 15 were in his experience best.

Mr. Bowslaugh, Grimsby, said the Concord gave good satisfaction.

Mr. Cline found the Concord profitable.

Mr. Biggar, of Winona, said he had an acre set out, and thought the Concord and the Isabella were the best. The Delaware did well with him, but required a great deal of care. He said it was a great mistake in marketing grapes in the careless way they are packed. The price of grapes fell this year on account of the quantity of peaches in the market. He made a point of using new, clean baskets. He thought that the consumption of grapes was increasing. The Creveling had done very well with him. He had been advised to set three acres of this grape. He thinks this grape will supersede the Concord. He used well-composted barn-yard manure and ashes when he could get them. Some prune too much at their vines, and some not enough. A grower should be acquainted with his vines. He had fifty vines of the Clinton. The Clinton should be trained up high; prune when the buds are swelling. He planted them twelve feet apart. The vines produced 365 baskets last year, giving a profit of $537 in all. Of course the Concord seemed to be the most popular grape, but he had found great profit in the Isabella, which came after other grapes and brought a large price. He could not agree with Mr. Haskins that the market was overstocked, for the experience of last season had shown him that over thirty baskets could now be more easily sold than ten could a few years ago, and he thought that the demand for grapes would increase. A few years ago a gentleman at Grimsby took ten days to sell a basket of grapes, and now during the season he sends in daily two teams laden with the fruit of the vine. He considered the Creveling the best grape; in fact, a leading fruit dealer in Hamilton had promised one cent a pound more for that kind than for any other. The Clinton was also a good grape. He thought no pruning ought to be done till the spring.

Mr. Bell, of Hamilton, said he thought the Hartford the most profitable; it ripens at the latter end of August, but dealers don't like them because they drop off the bunch. Next to the Hartford, the Concord is the best. The Delaware is very good, and next to the Concord, which is the best I have got; had grown Rogers', but they are not as prolific as the Hartford and Concord, which are the best, the Delaware third. A piece of land of his, 100 by 50 feet, yields 600 pounds.

Mr. Woodley said the Eumelan was a good grape, but the Salem was his favourite. In planting he digs the trench three or four feet deep, and puts in sods, bones &c., and then fills up with good native soil. He likes Rogers' Nos. 4, 15 and 19.

Mr. Leslie, Toronto, had not much experience in raising grapes. A friend of his was well pleased with the Eumelan. In the neighbourhood of Toronto grape growing was a pretty hard business.

Mr. Lester said No. 9 keeps very well, and No. 15 were tolerably hardy.

This closed the discussion.

The President brought on the next subject, before doing which, however, in a few very complimentary remarks, he stated he would introduce and welcome Professor Buckland, who, he was now pleased to see, had come amongst them.

A discussion then took place on

"THE LEGAL SIZE OF THE APPLE BARREL."

Messrs. A. M. Smith, Wm. Haskins, Jones (Rochester), W. F. Fearman, and others, spoke pertinently on the propriety of assimilating our Canadian apple barrel to the same size as that of Western Few York which holds 100 "streaked" quarts, less by more than a peck than the common flour barrel.

A resolution was come to that the President should call upon the Secretary of State, at Ottawa, and explain what were the wishes of the Association, which was unanimous in favour of making the alteration.

"HOW TO SECURE UNANIMITY IN DESTROYING THE CODLIN MOTH"

was then discussed.

Messrs. Caldwell (Dundas), A. M. Smith, Jones and Saunders (London), spoke at considerable length, when the matter was referred to a Committee, which should devise some means of securing unanimity of action in the matter.

The meeting then closed.

REPORT OF THE COMMITTEE APPOINTED AT THE WINTER MEETING TO EXAMINE AND REPORT ON THE SEEDLING AND OTHER FRUITS ON EXHIBITION.

Mr. David Bradt, of North Glanford, exhibits a very fine seedling apple, a russet, large, handsome, of good flavour and very promising, and your Committee would recommend it for the first prize as the best seedling apple now on exhibition.

Mr. McKay shows a medium-sized reddish russet apple, of fair flavour, firm flesh, but rather acid; would probably be a good cooking apple.

A very handsome apple, of fine quality and good flavour, is exhibited by Mr. E. Blagden, claimed to be a seedling; but from its close resemblance to a Spitzenburg, your Committee feel some doubt as to its origin, but would suggest that some member of the Fruit Committee visit the grounds of Mr. Blagden and inspect the tree when it is in fruit.

A fair sized yellow seedling apple is shown by Mr. J. Rymal; but although a pretty looking apple, its quality is not such as to commend it for further propagation.

Mr. Thos. Caldwell, of Dundas, exhibits several varieties of seedling apples. No. 1 is a very large apple, striped with red, somewhat resembling the Blenheim Orange; but this, as well as the other varieties, having been frozen, we are unable to judge of their merits, and would suggest that Mr. Caldwell submit these seedlings again on a future occasion in better condition.

A medium-sized very firm fleshed seedling is shown by Mr. A. M. Smith, of Drummondville; is in excellent condition now, and is said to keep until May.

Mr. D. Vanduzer, of Grimsby, exhibits a seedling above medium size, of handsome appearance and good quality, not unlike the yellow Newtown Pippin in form, but coarser in flesh.

Mr. Allen Moyer shows three varieties of seedling apples: one a medium-sized sweet apple, of fair quality; the others we can scarcely judge of, as they are a little past their season.

Mr. Arnold, of Paris, shows samples of his No. 1 seedling apple, the variety selected by the Association for dissemination in 1879.

Mr. Fearman, of Hamilton, exhibits some well-preserved grapes, comprising Rogers' Nos. 15, 4, 19, and Diana. No. 15 especially is in excellent condition.

Mr. Haskins shows several bunches of his new seedling grape, a hybrid between the Hartford and Black Hamburg. Although this grape is not so well preserved as some others, yet your Committee think that, even in this imperfect state, in flavour it is second to none exhibited.

Mr. Samuel Woodley, of Hamilton, exhibits a bunch of one of Rogers' hybrids in prime condition.

Mr. A. M. Ross, of Goderich, shows a very fine collection of grapes, consisting of Rogers' Nos. 1, 3, 9, 15 and 19, also Iona and Diana, nearly all of which are in a fair state of preservation.

We think that we may say of the whole of the grapes now on exhibition that they are scarcely equal, in point of flavour, to those shown on previous occasions.

SUMMER MEETING.

The summer meeting was held in the Town Hall, Drummondville, on the 29th day of June, 1875. The President took the chair, and the Secretary read the minutes, which were approved.

The President reported that he had seen the members of the Government anent the establishing the size of the apple barrel. He stated that he was received very kindly, and assured that the Government would take the matter into their serious consideration. He also read a letter which he had received from Mr. J. B. Osborne, Beamsville, containing extracts from letters received by him from fruit dealers in Scotland, making objections to any change in the size of the apple barrel.

The meeting then proceeded to discuss the following questions :—

1. What has been the effect of the past year on fruit trees, more especially the peach? and what means shall we take to prevent a recurrence of such calamities, and what lessons shall we draw from these calamities?

2nd. Varieties of the strawberry, their value for market and for amateur cultivation? Also, the best methods of cultivation?

3rd. Varieties of the raspberry, their value for amateurs and for market, and modes of culture?

4th. Varieties of the cherry—which are best for market, and which for amateurs?

First Question.

Rev. Vincent Clementi, Peterborough—In my section of the country the snow covers the ground all winter, hence the trees are not subject to the injurious effects of the severe cold. Pears, however, do not succeed well, but apples generally do well—would never plant without mulching, and in consequence never loses a tree. Takes the liberty of suggesting to the Association that it is desirable that a local agent be appointed in every district to look after the interests of the Association, solicit membership, and receive the trees or plants for distribution among the members in each locality.

Mr. Burrows, of Drummondville, mulched his trees in the autumn; they came through the past winter safely.

Mr. Biggar, of Drummondville, lost a number of his trees, yet believes that had he mulched them in the fall he would have saved every one of them—thinks the injury was done in the root.

Mr. Elliott, of Guelph—The past winter was the most destructive to the plum and pear trees that he ever knew; attributes the destruction to the severity of the cold, which was from 26° to 36° below zero. He considers mulching a most valuable protection, not only against the cold of the winter, but by retarding the circulation of the sap in the spring, keeps them from coming into blossom too early, thereby escaping oftentimes the late spring frosts.

Mr. A. M. Smith, of Drummondville, believes that the excessive drought of the previous summer aided the extreme cold of the winter in producing the deleterious results of which we have had experience; but is inclined to believe that mulching would have done much to have lessened the amount of injury.

Mr. Lewis, of Clifton, mulched all his trees last season with leached ashes, and lost none.

Wm. Saunders, London, planted peach trees. Began with a hundred trees. They gradually failed, dying from year to year, and the last winter finished them, so that now he has none. Thinks it was not the severity of the midwinter, but of the spring, which caused their death. He also lost from five to six hundred pear trees, a hundred cherry trees and some twenty plum trees; also a few Baldwin apple trees. He has heard some complaints from neighbours of loss among the Rhode Island Greenings. Many of the trees came out in leaf and blossomed, and then died. The Delaware vines facing the east are all healthy, although facing the west many were killed. The fence shelters those facing the east from the west winds, and the others from the east winds. The thermometer fell to 26° below zero. Thinks mulching would be of great service as a protection against the extremes of both cold and heat.

A. Morse, Smithville—Last summer I lost some pear trees, and last winter a few peach trees. Two of these trees were not mulched, and though they began to leaf out, the roots being killed, there was consequently no flow of sap to keep up the growth. It is my opinion that the dry weather of summer and the extreme cold of winter combined to cause the injury.

D. Caldwell, Galt—Each season has its own peculiarities, and this is true of the past in an especial manner. The wood of the trees seemed perfectly sound early in the spring; then there was a warm spell, followed by a spell of severe cold. The trees having a north and

west aspect came out safe. Of those on a south and east aspect many were killed. Trees on the tops of dry knolls were killed at the root. Those trees with a south and east aspect were more protected by the snow than those with a north and west aspect. Plum trees that fruited heavily last year were not killed. Grape vines in low places were killed to the ground, while those on high and dry places were safe.

S. D. Willard, Geneva, New York State—Dwarf pear trees have been badly killed at Geneva, but not cherry, plum, &c. ; but the trees on the north and west sides of slopes were more injured than those on the south and east. In my own orchard mulched trees all lived, and the large trees are loaded with fruit. The thermometer fell as low as 20° below zero.

Mr. Forster, Flamborough—Peach trees in a sod have done as well as usual.

Mr. Dempsey, Albury, has a few peach trees in tubs ; the tubs plunged in the soil under a shed. They started to grow in the spring, and some set their fruit ; but now all are dead save one. The thermometer fell to 30° below zero. His dwarf pear trees were all killed a few years ago by the winter. During the past winter he suffered most heavily in his standard pear trees ; he lost all his Bartletts ; his trees of the Flemish Beauty have suffered badly from some unknown cause—he is not satisfied that it was caused by the cold of the winter. In the spring the blossoms nearly opened and then perished ; but the trees have since begun to leaf out. His Bartletts, and those of a like degree of hardihood, notwithstanding that their roots were well covered with snow, died. The snow drifts were very heavy, some of them ten feet deep, covering top of tree and all. The tender varieties, notwithstanding that they were thus covered with the snow, died. The apple trees generally have come through safe.

Charles Arnold, Paris—Last winter was very destructive to trees, in part owing to the drought of last summer ; when the thermometer indicates fifteen degrees below zero, it has been thought that that degree of cold was sure to kill the blossom buds of the peach, but we have this year learned that this is not always the case. The ground was frozen to the depth of six feet. The fatal results were probably owing more to the second freezing, which we had in April, than to the winter's cold. All my cherry trees which were budded on the Mazzard stock are dead, while those budded on the Mahaleb stock are all living. The Hornet raspberry has stood better with me than the Black cap sorts. The Clarke, too, has come through better than the Philadelphia. Another variety, which has hitherto proved so tender that I had resolved to root out, came through unhurt. I consider a dry autumn to be usually favourable to the safe bringing through the winter.

J. Morden, Drummondville—Of the peach trees, my Early Purple and Early Crawford are all alive, while Hale's Early are all dead, except those standing along the fence, where they were sheltered by the snow. Grapes on open trellis are generally doing well. Thinks the past winter exceptionally severe—that we may never see another such season, and that those who continue to plant will yet reap abundantly.

Jonas Neff, of Port Colborne—I mulched my trees in the fall; none of them suffered from the winter. I used chip dirt covered with ashes. The trees remained perfectly dormant until quite late in the spring, and did not feel the warm spell in April. I lost only the Isabella grape.

Smith, Glanford—My pear trees are all alive, and so are most of my peach trees; but they do not seem to be in vigorous health. They bore heavily last year, and it may be that they are suffering to some extent from that cause.

Smith, Sr., Glanford, thinks that the want of moisture may be the great cause of the trouble. He watered his trees well, covered the ground over the roots with coal ashes, and tramped the snow as often as it fell, that caused it to freeze hard. Not one of my trees were injured, and I have some twenty sorts. What troubles me most is the peach borer.

Mr. George Marlatt, of Oakville, lost neither pear, plum nor apple—only a few peach-trees,

Henry Crotty, Ingersoll—My dwarf pear trees were very badly injured—lost about half of them. They were from seven to eight years old. The thermometer fell to thirty degrees below zero. We had very unusually dry weather the past three summers. This seems to have weakened the trees, so that they were less able to withstand the cold. The trees came out in leaf and in blossom, and then failed.

Morris, of Drummondville—Those of my trees that were standing on dry ground are all dead, while those in the moist ground are all living.

J. Steele, Pelham—It is not the amount of cold that kills the peach buds, but the want of sufficient maturity of the wood, I lost a great many peach trees last winter; those standing in the lowest places have done best. Those that stood in sod did worse than those in the clear ground. My soil is light sandy—I applied salt on the 1st of August to the ground, sprinkling it under the tree. None of those treated in this manner are dead. Two years ago the Isabella grape vines were killed to the ground, but this variety has come through the past winter unhurt; while the Delaware, that were not hurt two years ago, were killed. This, however, may be owing to the stimulus given to the Delaware by the liberal application of manures. My Adirondacs and Ionas are all alive.

Gilchrist, of Guelph—Our trees are young. The Bartlett is the only variety that has suffered—the plum trees are all right.

Vanduzer, of Grimsby thinks that mulching would save the trees—had noticed in his own orchard that the peach trees on high ground were killed, while those on lower and moister ground were alive.

Honsberger, Jordan—All the peach trees I lost were where my small fruits, such as raspberries, &c., are. Where there were no small fruits I ploughed the ground up to the trees; there they are all alive.

Moyer, of Jordan—The trees died chiefly on the high and dry soils. Those on clay soils did well.

Glass, of Guelph—Cut scions from a plum tree in April—three out of them are now alive and growing, but the trees from which they were cut are dead.

Corwin, of Drummondville—Before the second winter which occurred in the month of April, I took some cuttings from my grape vines and planted them; these cuttings are growing, but the vines from which I took them are dead.

Peter S. Wright lost some Delaware and a few Diana, not many of the Isabella. My Ionas are all right, and so are my Rogers' Nos. 15 and 4. Of my peach trees, which are eleven years old, standing in dry soil, I lost twenty-five per cent.

President Burnet, Hamilton—Of my two Clintons, one is killed outright—my Rogers' 3, 15, 9, &c., are killed, yet an apricot standing within four feet of them is not injured. My Louise Bonne are badly hurt. Stevens' Genesee and Rutter killed. Those with a western exposure are killed, those with a northern exposure are not hurt, nor those with an eastern exposure. There was a frost about the 11th, 12th and 13th of June, which badly injured my pear trees. I would say to those who are troubled with the peach-borer, that a bit of cotton rag tied about the collar of the tree will keep them out.

The following persons were appointed a Committee on seedling fruits on exhibition Messrs. Saunders, Willard, Dempsey and Gilchrist.

STRAWBERRIES.

Second Question.

A. M. Smith, Drummondville—The Wilson is the best for market as yet. As to the variety that will prove second-best, this may depend on the market they are to go to. In some cities the Triomphe de Gand is in high repute; in others it is the Jucunda; and in others, again, it may be the Green Prolific. For amateurs he would recommend the Jucunda and Triomphe de Gand, and for a late sort the Kentucky. Also thinks that the New Dominion (Biggar's Seedling) will prove an acquisition. In most country markets the Green Prolific would come next to the Wilson. Lenning's White is much liked, and will be a good amateur berry. Cultivate the Wilson in rows when growing for market, three and a half feet apart, and cultivate with a horse. It does not pay to cultivate them in hills. I have not used any artificial manures.

Mr. Caldwell, of Galt, had tried many sorts; the Wilson is the only profitable strawberry. It is hardy and prolific, and the fruit carries well. Have the land in good order, thoroughly trenched with the subsoil plough, and well manured. Plant and manure the plant with ashes. Take two crops of fruit, and then plough under. Protect in winter with a little straw—very little—and do not take it off too soon.

Steele, of Pelham, had found potato tops and a few corn stalks a better covering than leaves or straw.

Morris plants in rows three and a half feet apart—cultivates with the horse, thus throwing the runners into the rows—can get only one good crop from the Wilson—can get three good crops from the Kentucky, and raise them cheaper per quart than from any other sort. The plants stand the hot sun and the cold of winter better than any other. For a near market, the Kentucky, Colonel Cheney and the Downing are the most profitable; for a distant market, the Wilson. My soil is a sandy loam—have covered the plants with potato tops only once.

Charles Arnold, Paris—The Wilson pays the best. It will best bear knocking about. Metcalf's Early comes in early, and is a good variety; the size is small, yet it is sometimes profitable because early. The Jucunda is fine for the table, but yields no crop. The Charles Downing is a poor cropper. The best covering that I have tried is straw—clean wheat straw—spread out very thin; have tried shavings, but they blew off. I have raised a number of seedlings; I have *two*, one of which is a nice amateur berry.

Burrows thinks the Jucunda is the best he has raised.

Corwin—The Wilson is the best berry for market; have tried the Kentucky; value it for being late; do not value it so highly as Mr. Morris, though perhaps it may be because I have fruited it only one season. My soil is a light sand; use barn-yard manure, no commercial fertilizer; plant a new plot every year; in June use unleached ashes on those planted in spring.

Biggar—Wilson is the market berry. Triomphe de Gand gives only one or two pickings; it is a poor cropper. This is the third year of fruiting of my seedling, and I think it the best year. Soil, a light sand; the original plant is now seven years old, and is quite healthy.

Moyer, of Jordan, thinks well of Colonel Cheney and of Biggar's Seedling; the latter has better formed berries.

The Committee on Fruits presented their Report, which was received and accepted.

REPORT OF FRUIT COMMITTEE.

Mr. A. M. Smith, of Drummondville, exhibits a very fine collection of strawberries, in excellent order, consisting of seven varieties—Jucunda, Triomphe de Gand, Wilson's Albany, Green Prolific, Kentucky, Lenning's White and Biggar's New Dominion Seedling. The Jucundas are especially worthy of mention.

Mr. Edward Morris, of Pelham, shows five boxes of strawberries, also very fine, comprising the following varieties:—Charles Downing, Kentucky, Colonel Cheney, and Boyden's No. 30.

Mr. Charles Arnold, of Paris, exhibits six seedling strawberries—five of these are seedlings which have fruited for the first time this season; they are large, handsome and apparently prolific, and are of sufficient promise to warrant a more extended trial. With regard to the other seedling, which is known as No. 1, of which a box of very fine berries is shown, we cannot speak too highly. It has been exhibited before the Society for two years past. The flavour is delicious, and the berries are large. The flavour we think is finer than that of the Triomphe de Gand, and as for productiveness we deem it very promising. We might remark that this variety was awarded a prize by the Association when it was first exhibited at Chatham two years ago, and still maintains its high character.

Mr. C. H. Biggar, of Drummondville, has a very fine display of his new seedling, known as the New Dominion; three large plates of very handsome fruit are shown, as well as several very vigorous plants in boxes, on which are heavy crops of fruit. This berry is large, bright coloured, with a waxy surface and very uniform in size. It is a little later than Wilson, of good flavour, and from its productiveness we regard it as a very promising variety. We doubt whether it would be firm enough to carry any great distance. We cannot help congratulating Mr. Biggar on his success in this instance.

Mr. A. M. Smith, of Drummondville, shows a seedling apple of medium size and fair appearance.

Mr. A. Moyer, Jordan, also exhibits two seedling apples, one of large size, the other of medium size. The smaller apple has a very attractive appearance. All these apples being

out of season, we are unable to judge of their flavour, but they all show evidence of being excellent keepers, and we would suggest that they be brought before the Association again earlier in the season, so that their merits may be fairly tested.

WM. SAUNDERS
A. GILCHRIST.
S. D. WILLARD.
P. C. DEMPSEY.

There arose a desultory discussion on Insect Pests. One member had suffered much from one of the Geometer family, but not having traced its metamorphoses, he could not indicate positively which one of this very numerous family had been inflicting itself upon him. Most of the members present remarked that the gooseberry sawfly had disappeared from this part of the country, *i.e.*, from about the Niagara River.

RASPBERRY.

Third Question.

D. Caldwell—The only really profitable raspberry is the Philadelphia; it is the most hardy, and needs no protection.

Mr. Burrows thinks the Philadelphia the most hardy.

A. M. Smith finds the Philadelphia the best market berry. It is among raspberries what the Wilson is among strawberries. The Clarke is about as hardy, but not as prolific, yet in some markets it yields as much money. Both the Herstine and Elm City stood the past winter well. Of the blackberries, he prefers Davison's Thornless and Mammoth Cluster. He tried those varieties of Mr. Arnold's which he first sent out, but they did not prove satisfactory; has used chip manure as a fertilizer, and noticed that the plants made a fine growth.

Caldwell—The Clarke did not winter kill last winter.

Arnold—During the past winter many of our Black-caps were killed, while the usually more tender European sorts escaped. The Philadelphia has generally been quite hardy, yet has suffered more than many of those esteemed tender. The Mammoth Cluster and Davison's Thornless are good Black-caps, but there is no profit in raising raspberries for market at Paris. The General Negley is a fine Black-cap.

Mr. Willard, of Geneva, inquired if anyone had fruited the Brandywine and Highland Hardy, which varieties he had understood to be hardy. He had also been told that the Brandywine in the State of Pennsylvania had superseded the Philadelphia.

Elliott, of Guelph—We are obliged to lay down all our raspberry plants on account of the severity of our winters. The Philadelphia, Red and White Antwerp, and all other sorts, require this protection. It is of great benefit to mulch liberally between the rows both spring and fall.

Mr. Morden gave the testimony of a Hamilton market gardener to the effect that the Franconia was sufficiently hardy.

A. M. Smith found the Franconia too tender; it froze down every winter.

The President requested Mr. Saunders to give the meeting some information with regard to the hardihood of his new hybrid raspberries, whereupon he stated that the plants are all alive, though some of them were somewhat injured by the winter, yet several of them promised to be valuable sorts, very prolific and of good flavour.

Time failing to allow of the discussion of the cherry, on motion the President was appointed to summarize the lessons to be derived from this morning's discussion. He presented the following *resumé:*

1st. It was generally assented to that the extraordinary drought of the summer of 1874 had had a prejudicial effect upon peaches and other fruit trees, and that such effect was heightened by the continuance of the same dry weather throughout the fall, which tended still more to impair the vital energy of the trees, and thus rendered them still less able to resist the strain of an uncommonly severe winter.

2nd. The severity of the winter was followed by a few weeks of extraordinary mildness in early April. This mildness induced a sudden and early flow of sap, which was in a mo-

ment arrested by a second black winter, during which the temperature fell in many places below zero. It was too early a spring, and the frost nipping an incipient but premature growth, a fatal injury was inflicted, which resulted to all trees and plants thus prematurely stimulated.

AUTUMN MEETING.

The autumn meeting of the Fruit Growers' Association took place at Belleville, 5th October, 1875. The attendance, though not large, was very influential ; the wet state of the weather and bad roads, no doubt, contributed to keep many away. Amongst those present were the President, Rev. R. Burnet, of Hamilton ; Charles Arnold, Paris ; P. E. Bucke, of Ottawa ; A. M. Smith, Grimsby ; P. C. Dempsey, Ameliasburg ; Colonel McGill, Oshawa ; W. H. Mills, Hamilton ; Hon. Lewis Walbridge, McKenzie Bowell, J. H. Peck, Belleville ; Rev. Canon Bleasdel, Trenton ; Thos. Kerr, Sarnia ; John Graham, Sydney ; Geo. Weese, Ameliasburg, and many others.

Some time was occupied in arranging the seedlings and other fruits brought for inspection.

The meeting was then called to order, President Burnet in the chair. He regretted the unavoidable absence of the Secretary, Mr. Beadle, of St. Catharines, and gave a short *resumé* of the proceedings of the annual meeting which took place recently at Ottawa, and called on the meeting to elect a Secretary *pro tem.* Mr. Bucke, of Ottawa, was then chosen, and the following members were selected for Committees on Seedling Fruits :—

Seedling Apples.—Messrs. A. M. Smith, W. H. Mills, William Wells, J. Graham and P. C. Dempsey.

Seedling Grapes and Peaches.—Messrs. the Rev. Canon Bleasdel, Charles Arnold, P. E. Bucke and J. Clarke.

The Committee on Grapes and Peaches made the following Report :

P. C. Dempsey's No. 20.—White grape, large in bunch and berry ; well shouldered ; seedling of Hartford, crossed with pollen of Black Hamburg ; entirely free from foxiness of the native grape, and closely resembles the Sweetwater in flavour, with a slight musky taste, but owing to the backwardness of the season not sufficiently ripe to test its qualities thoroughly.

P. C. Dempsey's No. 60.—White, small compact bunch, parentage being Delaware crossed with Allen's hybrid ; sweet foreign flavour, earlier than Delaware.

P. C. Dempsey's No. 18.—White, large compact bunch, parentage the same as his No. 20 ; promises well in a more favourable season.

P. C. Dempsey's No. 25.—White, large-shouldered bunch, with fine-sized berry, parentage as his No. 20 ; a fleshy grape with a slight musky flavour, superior to either 20 or 18.

P. C. Dempsey's No. 19, but known as the Burnet.—Black, bunch and berry equal in size and flavour to Black Hamburg grown under glass, parentage as No. 20. (Hartford Prolific crossed with pollen of Black Hamburg.) This grape fully sustains its former high reputation in every respect, and will be sent out by the Association in the spring of 1878.

W. H. Mills' La Viega.—Red grape, good size, compact bunch, large berry, parentage Rose Chaselas and Diana ; sweet melting pulp ; ripens with the Delaware.

W. Haskins' A.—Black, medium compact bunch, parentage Hartford crossed with Black Hamburgh, thin skinned, juicy.

W. Haskins' No. 4.—Black, same size as Delaware ; parentage, Chippewa crossed with Black Hamburg ; juicy grape, probably good for wine.

W. Haskins' No. 1.—Black, bunch moderately compact, very early; parentage, Chippewa crossed with Black Hamburg ; thin skinned, juicy, well flavoured grape, first year of bearing.

W. Haskins No Name.—Black, small bunch and berry ; parentage, Rogers' 15 and Delaware ; ripe early in September, flavour resembling Delaware.

W. Haskins' No 2.—Black, small compact bunch, medium size ; parentage, Chippewa and Black Hamburg ; a melting, well flavoured grape.

W. Haskins' Hartford Seedling.—Black, small bunch, good flavour.

Peaches.—Dr. Haggart No. 1, medium size, good flavour, yellow flesh, free stone.

Dr. Haggart No. 2.—Fair size, medium flavour, yellow flesh, free stone.

This Committee recommends a $5 prize to Mr. P. C. Dempsey for his No. 25 white grape ; and a like prize to Mr. W. H. Mills, for his La Viga.

DISCUSSIONS.

The first subject of discussion was the best six varieties of summer apples, best six autumn, best twelve winter. Votes being taken by ballot, the following was the result:

Six for summer—For the Red Astracan, 11; Early Harvest, 10; Duchess of Oldenburg, 5; Sweet Bough, 6; Early Joe, 3; Strawberry, 3; Benoni, 3.

Mr. Smith, of Grimsby, raised a question as to similarity between Tart Bough and Early Harvest. Col. McGill, of Oshawa, said on his ground they were quite different. The President said he believed they were not the same.

Votes were then called for the best six autumn varieties, with the results below:

Snow or Fameuse, 10; St. Lawrence, 8; Gravenstein, 4; Fall Pippin, 3; Oldenburg, 3; Hawley, 3.

For the twelve winter apples, the votes stood:—American Golden Russet, 10; Northern Spy, 8; Rhode Island Greening, 7; Pomme Grise, 7; Talman Sweet, 6; Spitzenburg, 5; Swaar, 5; Wagener, 4; King of Tompkins County, 4; Baldwin, 4; Seek-no-further, 3; Roxburgh Russet, 3.

Professor Bell, at the request of the members of the Association, read an essay on the "Insects Injurious to Fruits." This able paper was listened to with marked attention, and at the close the Professor was greeted with much applause. The Rev. Canon Bleasdel moved that the thanks of the Fruit Growers' Association be given to Professor Bell. Mr. W. H. Mills seconded the motion, and it was carried unanimously.

The President tendered the thanks of the members present at this session, and requested a copy for publication in their Annual Report.

The discussion on the apple was then proceeded with.

Mr. Kerr, of Sarnia, said the Red Astracan is most profitable in his section; the Early Harvest was not much esteemed; the Rhode Island Greening was found to be quite hardy. With regard to other fruits, the Mammoth Cluster and Wilson's Early Blackberry, received from the Association in 1871, were both killed by frost, also the Eumelan Grape. He found that mice killed plants covered with straw. Cultivates Rhode Island Greening, Fall Pippin, Roxburgh Russet, Newtown Pippin, Golden Russet. Drains orchard by surface furrows, and keeps it cultivated.

Mr. John Graham asked how it was that the Snow Apple was sometimes ranked amongst the late fall and sometimes amongst the winter varieties?

The President stated that the season during which the Snow was in good order for eating was very extended, and that by keeping fruit in cool, well-aired rooms, with an equalized temperature—say 42°—the season for all fruits might be much prolonged.

Col. McGill remarked upon the likeness of the Colvert and Gravenstein, and stated the Roxburgh Russet and other Russets were not favourites with him. (There is no resemblance either in appearance, flavour or time of ripening between the Gravenstein and Colvert.)

Luther Hall set out last year seven hundred trees—three hundred and fifty Greenings and the rest Baldwins.

Mr. Johnson had planted these varieties, Greenings and Baldwins, but finds Golden Russets his best for winter keeping; but from a pecuniary point of view he found Red Astracan for early, and Fameuse for late, the most profitable kinds grown. Talman Sweet also did well with him.

Mr. John Graham liked the Red Astracan and Early Harvest, both of which he cultivates largely.

Mr. Ralph R. Bird, of Sydney, grows Early Harvest and Red Astracan, but Colvert was his favourite. Considered American Golden Russet a long way ahead of Roxburgh Russet. The Rhode Island Greening stands low with him, the trees not being hardy. The Swayzie Pomme Grise received from the Fruit Growers' Association was dead when it reached him. (We are sorry to say this is a very common complaint.) He found Northern Spy and Seek-no-further best for profit. He had not allowed his Wagner to bear yet; it grows freely, but not a favourite on account of its tenderness. He has one hundred trees of Spies. Talman Sweet sells well, and is a fine fruit for cooking. He has also a Chance Seedling, which he finds a good keeper.

Dr. Coleman found for summer use the Red Astracan the best apple, and an immense favourite, bears well, and the trees hardy, and a rapid grower. Every one was fond of the

fruit. For some unexplained reason the Duchess of Oldenburg was not known in his district, or the Keswick Codlin. For autumn, the Snow was considered the best. The Northern Spy did well with him; cultivates his orchard by growing the ordinary field crops, such as potatoes and corn.

John Graham found his trees badly scorched at the tips of the branches.

Dr. Palmer said he had known Dr. Coleman's orchard for years, and that the trees were, and always had been, in perfect health.

Mr. McCammon planted trees both on bottom lands and on the hill sides; those in the low grounds all died out, whilst those on the slopes succeeded well, and bore good fruit. The trees suffered from frost burst. Has seedlings which ripen late in the summer.

Mr. McGann protected the roots of his trees with corn stalks.

Mr. Lott plants his apples twenty-five feet apart, and so does Mr. Potter.

Mr. Bogart planted thirty feet apart.

Mr. Hagaman plants twenty feet apart.

Mr. John Graham plants thirty-six feet apart.

Mr. L. Massey plants twenty feet apart.

Mr. A. McClatchey planted one thousand trees twenty feet apart. His trees succeeded best on hill-sides; those on low ground were covered with mossy substances and black spots.

Mr. McCammon found it more difficult to graft on a sweet tree than on a sour one; why, he could not say.

MISCELLANEOUS.

Mr. P. C. Dempsey has observed in some seasons an abundance of blossom and afterwards but little fruit. He considered that different causes could be assigned for this apparent anomaly, the tree might exhaust itself in producing the blossoms which afterwards it had not strength to fertilize. He had read in some English paper that a sort of liquid honey was noticeably on the flowers; this it was found caught and attached the pollen floating in the air to the flowers. Some people attributed the non-setting of the flowers to east winds, some to west winds, &c.; but for his part he thought that any wind that dried this honeyed substance was sufficient to make the tree barren. On the other hand, a rainy time so diluted it that it rendered it insufficiently sticky or washed it away altogether; hence another reason for barrenness. In cultivating fruits in orchard houses, nature was at times assisted by art with regard to this liquor, by diluting honey and applying it to the blossom with a camel's hair brush, thus assisting the female organ or stigma to catch the pollen.

Mr. Arnold said that Mr. Dempsey seemed to blame the female, but he blamed the male. In many instances wild grapes are staminated, and consequently not pistilated; he blamed the wet weather more than the dry, which created influences which prevented setting.

This discussion was exceedingly interesting, and it is regretted that the Secretary was unable to take fuller notes, so as to be able to preserve the remarks for the Annual Report.

Mr. McCammon, Hastings County, has noticed that if we have wet weather in June, when the beech tree is in blossom, the beech nuts will be few in the autumn.

Mr. Dudley found the Northern Spy usually bore good crops of fruit; he accounted for this from the fact that it was late in flowering in the spring.

Mr. McCammon had a tree that perseveringly refused to fruit, and requested to know what he should do with it, for at present it was like the traditional fig tree—it bore "nothing but leaves."

The President suggested he should wire one or two of the branches about the third or fourth week of June, and that would probably bring both blossoms and fruit; the Spy, however, was a tree that did not fruit early in life. In planting orchards, the Wagener should be selected as the first tree for fruit after planting.

Mr. Young stated that the black knot and curculio were so prevalent in his district about Georgetown, he found it impossible to cultivate the plum.

Mr. McCammon said he had not tried the finer sorts; the common wild red was the only one grown near him. He found the trees were sometimes *blasted;* the Wild Goose plum was perfectly worthless.

Mr. Arnold had been cheated by having this variety imposed upon him, and had cultivated it, but found the fruit very inferior.

Mr. Dudley wanted to know the best varieties, in order that he might supply them to his customers. He already had the Lombard, Jefferson, Peach-Plum, and many others.

The best districts for the cultivation of the plum were stated to be Owen Sound, Guelph, and Goderich. At Belleville it was stated they had to contend against hard winters, black knot and rot, and from these causes they were not much cultivated there.

Mr. Bucke stated that curculio had made its first appearance in Ottawa this season; hitherto they had been perfectly free from this pest. They had only, however, cultivated the wild red, which was in some instances of a remarkably good kind, and for preserves was highly esteemed. The stone, as in most of the wild sorts, was out of all proportion in size to that of the fruit; but, as these were removed for jam, they served an excellent purpose—fruit nearly as large as the Lombard, light red colour, with deep red cheeks. Cultivated kinds were being introduced, and this might account for the appearance of the "little Turk." No black knot known. His Jefferson, Washington, Yellow Egg, Lombard, Coe's Golden Drop, and several other kinds frozen down to snow line; a neighbour had fruited some of the finer sorts, but on very low beds.

How best to protect our people against dishonest tree pedlers?

Mr. Dempsey thought this might be done by popularizing the "Fruit Growers Association" and getting people to take an interest in the meetings, where a great fund of information could be obtained, and any one in difficulty could have the opinion of the best fruit growers in Ontario gratis, as the meetings were always attended by practical men who were able and willing to give any information required.

Mr. Arnold thought Mr. Dempsey had covered the whole ground. Many people had been bitten but didn't like to tell.

Is gooseberry culture profitable? Mr. Bucke, Ottawa, finds the Houghton seedling the most profitable berry to grow of all the small fruits, retailing in his locality readily at 15 cents per quart, the season is much prolonged by the purposes for which this fruit is used, first in its green state for tarts and stewed; it also makes an excellent fruit to "can," that is to preserve in the "Jem" or "Mason" jars, with one quarter of a pound of sugar to a pound of fruit for winter use, on its becoming about half ripe, that is, near turned in colour. It makes one of the very best preserves known, having a high flavour which is not killed by the sugar.

The Houghton is an immense and constant bearer under good treatment, has no objection to manure of the richest description, will revel in an annual and liberal dressing of *nightsoil mixed with peat* or coal ashes lightly turned under with a digging fork. Its enemies are restricted to the sawfly, which is readily destroyed with a solution of white hellebore, one tablespoonful to a pail of water. No borer has yet attacked its stem, it is therefore free from the worst enemy of the red and white currant, raspberry, &c. This variety of gooseberry is also easily propagated, whereever the branches touch the ground they readily root, making plants not dissimular to Blackcap Raspberries, these natural layers may be planted in rows and will make bearing bushes in two years' time, and may be then sold at from eight to ten cents each by the hundred, the profits from this source is not inconsiderable. Having so far had little experience from the Downing distributed by the Association; he had endeavoured to get this variety from Rochester, but the first year the order was not filled by some mistake, and the second year the Houghton was sent in its stead.

The plant received from the Association was a very weakly one, and so far only a few berries have been obtained from it.

The members of the Belleville Horticultural Society extended an invitation to the members of the Fruit Growers' Association, to a dinner at the Dominion House, at half-past 7 o'clock on the 5th October. The invitation was gladly accepted. After the cloth was removed and the usual loyal toasts were drank, the health of the President of the Fruit Growers' Association was given by the Honourable Lewis Walbridge. The President, in returning thanks, gave a short account of the origin and history of the Association, stating that the few members who at first organized it had proposed to have an experimental garden at Hamilton or St. Catharines, but like the seat of Government question, the parties could not agree upon any one place. So they at length decided to make Ontario one

large garden ; the different degrees of climate would suit to test the hardiness of the different fruits sent out. This had been found so far to work well, and by having these meetings at various points, it awakened an interest in that locality. The President also went on to show the extent to which the Hybridists, Arnold, Dempsey, Mills, Saunders and Haskins had gone to improve our fruits and grains. The Burnet grape, which they had all seen at the City Hall, was one of the greatest efforts of the Hybridist, Mr. Dempsey, and would hand his name down to posterity. Nor were some others far behind. La Viega, originated by Mr. W. H. Mills, was very little behind it, and some of those by Mr. Haskins, although not up to the standard in size of bunch and berry, were not much behind the Delaware, and being earlier than that grape, would suit in some localities where those so far tried had failed.

MORNING SESSION.

WEDNESDAY, 6th October, 1875.

REPORT.

At the session of the Association held this morning the report of the Committee on Seedling Fruits was read, and is as follows :—

We, the Committee on Seedling Fruits, appointed at the meeting held in the Town Hall, Belleville, on the 5th of October, 1875, beg to report, as to the general appearance of the new fruits brought to this meeting, that they far exceed in point of beauty and number any display of seedling fruits heretofore made. Among the number we find thirty-five lots of apples, represented by the parties bringing them as seedlings, and not under general cultivation. Many of these we consider promising well, but at the same time regret that we are not in a position to judge of the merits of any of the winter varieties, more than to make a passing remark on their general appearance, and would recommend to the owners of these fruits to submit them to the Standing Fruit Committee in their proper season, say at the winter meeting of this Association, to be held in the City of Hamilton in February next, sending them to the President a few days prior to such meeting, accompanied with full description and with the name and address of the party forwarding them. This will enable the regular Committee to have time to form a correct opinion of their merits. We find it a difficult matter to arrive at a classification of some of these fruits into winter and fall varieties, and on this point we advise the exhibitors to be hereafter more explicit. We have classed nineteen of these lots as winter and sixteen as fall varieties, and hope our judgment may be sustained.

Mr. James Clarke, of Belleville, shows six varieties, very fine in appearance—four winter and two fall. One of the fall varieties, a sweet apple of medium size, oblong, slightly ribbed, corrugated basin, stem short and set deep ; colour, greenish yellow streaked with red, slightly dotted with brown specks ; flesh sweet, juicy, crisp and aromatic. To this we award the Directors' Prize of $5, and at the same time would advise its wider cultivation.

Mr. Wilson, of Whitby, shows four varieties of winter. One appears as if it might keep till midsummer next. Remarks on this apple would be premature. It should be submitted in season accompanied with full particulars.

Mr. J. Graham, of Sidney, hands in seven varieties, all of which are beautiful to look upon ; three winter and four fall, but not quite up to the standard laid down by your regulations for an award.

Mr. B. H. Vandevoort, also of Sidney, shows two varieties—one a winter, sweet, of very fine appearance, and a fall variety resembling Gravenstein, but lacking flavour.

Mr. William Russel, of London, shows a fall apple, large, irregular, striped, which might be a good cooking apple.

Mr. J. A. Weese, of Albury, shows a dark red apple, large, irregular shape, deeply ribbed, resembling Black Detroit, but not superfine in colour or flavour.

Mr. H. J. Lott has three plates containing several varieties, none of superior excellence except one of a deep red colour, which we hope to see before the winter committee.

Mr. S. McCammon. of Tweed, shows a fall variety, sprightly and juicy, but unfortunately water-cored.

Mr. A. J. Gregory, of Mount Forest, shows one variety of fall, not entered as a seedling, from Woodstock, without name.

Mr. Samuel Wiener, of Jordan, shows a remarkably fine-looking winter apple, which we hope to see at Hamilton in season.

Mr. P. C. Dempsey, of Albury, shows a variety of winter apple which is very promising.

Mr. W. H. Mills, of Hamilton, shows a variety of winter seedlings, of no particular excellence.

Mr. H. Wellbanks, of Rednersville, shows two varieties, neither of which we think are above the average.

Messrs. Cosner, of the Bay of Quinte, shows one variety of winter apple.

Hon. Lewis Walbridge exhibits a fine specimen of small, light coloured winter apple from seed brought out from France, which we believe bids fair for dessert fruit.

Pears (seedling).

Mr. John Magill, of Oshawa, shows two varieties of seedling pears. The one from Flemish Beauty we consider not quite up to its parent in quality or beauty, though very fine. The other is a fine specimen of winter variety, which we hope he will submit at Hamilton. He also shows a variety of seedling crabs.

Mr. Clarke and Mr. William Lott also contributed seedling crabs.

W. H. Mills,
A. M. Smith,
P. C. Dempsey.

Besides the seedling fruits exhibited, your Committee find upon the table a very fine display of apples, pears and grapes of our old established and well-known varieties, some of them grown in localities which have heretofore been considered beyond the limits of the fruit-growing districts.

Mr. Bucke, of Ottawa, five well-ripened specimens of the Clinton, Millar's Burgundy, Othello, Eumelan and Oporto grapes.

John McCammon, of Tweed, shows Rox Russets and Sops of Wine, and some other varieties of apples,

J. Graham and George Weese, of Sidney, show several plates of magnificent Baldwin, King of Tompkins, Rhode Island Greenings, Spitzenberg, Seek no Further, Maiden's Blush and Colvert apples.

J. Graham also shows fine samples of Flemish Beauty and Louise Bonne de Jersey pears.

P. C. Dempsey shows a plate of beautiful Washington Strawberry apples, also Ribston Pippins and Hawthornden, besides a plate of Mount Vernon pears.

Col. McGill, of Oshawa, shows good samples of Howell, Beurre Clairgeau, Beurre Diel, Oswego Beurre, Sheldon, and Figue d'Alençon pears.

W. H. Mills, of Hamilton, shows a fine plate of the Mother apple, also Swayzie Pomme Grise (the variety that was sent out by the Association last spring).

Mr. A. T. Gregory, of Mount Forest, sent a fine specimen of crabs, which were on exhibition, also a very fine Fall apple, somewhat resembling the Colvert in appearance, but in our opinion of better flavour. It is unknown to us, and we would recommend it for cultivation, and if it is a seedling, would consider it worthy of a prize.

And last, but not least, we found our worthy President had added to the display a plate of Hubardson None Such apples, also ten varieties of his celebrated pears, among which were the King, Beurre Superfine, Beurre Brettoneau, Theodore Van Mons, and others not named.

A. M. Smith,
P. C. Dempsey,
W. H. Mills.

INSECTS INJURIOUS TO FRUIT TREES.

THE APPLE AND PEAR.

By James T. Bell,

Professor of Mines and Agriculture, Albert University, Belleville.

Although the cultivation of fruit is not practised to so great an extent in this District of Ontario as in other parts of the Dominion or in the United States, the productions of our gardens and orchards are of sufficient importance to be recognised as staple articles of commerce and consumption, and every circumstance which affects our fruit-crops is deserving of attention as a subject of public interest. No less is it a matter of private and individual concern, whether to the enterprising cultivator who invests his capital, and expends his time and labour in the pursuit of fruit-growing, or to the amateur gardener, who adorns his little plot of ground with a few choice fruit trees, pet grape-vines, or favourite berry-bushes, raspberry-canes or strawberry-plants.

In our uncertain and variable climate, the gardener has many sources of anxiety, and not unfrequently of serious loss, from the vicissitudes of the weather. His trees, shrubs and plants are subject to injury from late spring frosts, high winds, hail-storms, fog-blights, excessive rains, long continued droughts, and other atmospheric and seasonal influences, for which there is no remedy but patience; and in addition he has to contend with a host of insect enemies, whose multitudinous legions often not only destroy the season's crop, but inflict lasting injuries upon his trees and vines, which at best require a long time to recover from, and not unfrequently kill the plants themselves.

It is, therefore, of vital importance that every cultivator of fruit, whether on a large or small scale, should be acquainted with these foes, so far as to be able to recognise their identity, and to distinguish them from those whose mode of life renders them harmless or beneficial, and to get such a knowledge of their history and habits as may enable him to follow them into their hiding places, and destroy them before they have time to commit serious injuries, or to adopt such means and contrivances as may prevent them from having access to his trees and plants, and it is a duty incumbent upon every one who possesses even a single tree, both for his own sake and that of his neighbours to see that these insidious and dangerous enemies should not be suffered to commit their depredation, and propagate their species without at least some attempt being made to check their ravages and reduce their numbers. It is a fact usually well-established and alarming that the insect pests of the farm and garden are becoming much more numerous and their depredations much more frequent and extensive of late years than formerly. Their numbers and their domain appear to have increased commensurately with the extension of settlement, not only by natural increase, stimulated by the multiplication of the cultivated trees and plants upon which they feed, but also by the introduction of new, and in many cases more destructive, species in the plants and among the seeds we import from other localities.

These depredators, though belonging to five of the orders of insects, may, for practical purposes, be divided into three classes: first, those that burrow in the wood; second, those which prey upon the leaves and blossoms; and third, those which attack the fruit. Of all these the first division is most to be dreaded, for while the others may disappoint the hopes of the fruit grower of a crop now and then, those of the first are apt either to destroy the tree altogether, or so far to reduce its vitality as to diminish the quantity and deteriorate the

quality of its fruit to such an extent as to make it a matter of economic necessity to cut it down, and replace it with another.

They are also the more to be dreaded because their attacks are so insidious that in most cases the mischief has been done, and has become irreparable before we are aware of their presence. All seasons do not, indeed, appear to be equally favourable to their propagation, and in some years our trees and bushes are comparatively exempt from their ravages; but as we have no indications by which to judge beforehand of their presence or absence, a constant and unremitting vigilance is necessary at the critical period of the year, if we wish to escape the loss and annoyance consequent upon their being permitted to establish themselves within the wood.

It is only while in the second, that is the larva or grub stage of their existence, that the borers are injurious, the perfect insects being entirely harmless—indeed, they do not live long, many of them only a few days, or even hours, after assuming the *imago* or perfect shape, their sole function in that stage of their existence being to propagate their kind, which is generally effected very shortly after they emerge from the *pupa* or chrysalis. It is, therefore, in the *larva* state that they can be sought out and destroyed to greatest advantage.

In treating of the subject, I shall take each fruit separately and enumerate the insects which infest it, and the various remedies that have been found effectual in reducing their numbers or preventing or mitigating their ravages.

The Apple.

The borers which infest the apple-tree are three in number: first, the *Saperda bivittata*, a hard-shelled insect, about three-quarters of an inch long. It belongs to the family of the *Cerambycida* or goat-horn beetle, and is easily distinguishable from its congeners and all other insects by its remarkable appearance. It is a pale umber brown or citrine colour, with two broad white stripes extending, one on each side, from the front of the head to the extremity of the wing-cases. The larva of this beetle is about an inch in length, and is of a yellowish white colour, of very soft texture, but furnished with a hard brown head, and a pair of powerful black mandibles or jaws. The perfect insect is seldom seen, as it remains in concealment during the day, and flies only at night. The female lays her eggs close to the base of the trunk, at the level of or a little below the surface of the ground, on what is called the "collar" of the tree. These soon hatch out into tiny white grubs which eat through the bark, and establish themselves in the sap-wood, upon which they feed. Their first operation is to excavate a circular cavity under the bark, about the size of a half-dollar; this they keep open for some time by thrusting out their castings, which appear like fine saw-dust; and it is by this that their presence in a tree is most readily recognised, though it requires close observation to find it. When a borer is thus discovered, an elastic wire, such as a fine knitting needle, thrust up the hole and moved about in various directions will often be effective in killing the grub; or an injection of strong potash lye from a syringe with a bent needle may be tried. These means may answer during the first few months of the larva's existence; but after it has become fairly established, its position is much more difficult to ascertain, though if any point of its burrow can be discovered, it will be easy to follow it to its place, as it always works upwards, by introducing a fine wire till it meets resistance, then measuring the length of the part inserted in the proper direction, and there making an opening with a small gouge, or a sharp pointed knife, when, if still below the creature, a new measure can be taken, and a new opening made, till the robber's den is reached and his doom inflicted.

I am strongly of opinion that the presence of grubs in a tree may be discovered by listening for the sound made by their mandibles while gnawing into the substance of the wood; and that for this purpose an instrument like a stethoscope, that is, a taper tube of tin, wood or leather, with a wide end to embrace a part of the tree, and a narrow aperture to apply to the ear, would be found useful. I have often, while watching the proceedings of the woodpeckers, seen them apply their ears to the tree they were examining, in an evident attitude of listening; and once, when on a mining expedition in the township of Lake, I slept in an old lumber-shanty, which was used as a dwelling-house by the farmer with whom we boarded, the logs of which were numerously tenanted by the larvæ of the pine-borers, and in the deep stillness of night I used to hear their jaws going like hundreds

of diminutive saws in a fairy furniture-factory. The examination for their sawdust-like castings must be made in the months of June, July and August; but their rasping must be listened for from April to November.

The chief preventive measures which are recommended are to wash the trunks of the trees with strong potash lye early in June, repeating the operation two or three times during that month and in July, and after each washing to apply a thick coat of cold-made soft soap to the lower part of the stem, quite down to, or a little below the collar of the tree.

In his report on the insects affecting the apple-tree, published in the report of the Commissioner of Agriculture and Public Works for the Province of Ontario, for the year 1870, the Rev. C. J. S. Bethune, M. A., of Port Hope, states that this insect does not occur in any part of Canada in which he had resided. I have, however, in my possession a specimen which was captured in the year 1873, near the Town of Belleville.

The second borer which affects the apple-tree is also a beetle, but quite different in appearance from the *Saperda*. It belongs to the family of the *Buprestidæ* or cow-burners, and is about half-an-inch in length, of an ovate form, rather flat convex shape, and of a very strong, firm texture. Many of its congeners exhibit most beautiful metallic colours, and it is of a dark glossy bronze itself. The grub is yellowish white, with a hard horny head, and may be distinguished from the cylindrical larvæ of the *Saperda* by the flattened shape of its body, which is broad towards the head, and tapers off to the tail. Its burrow is also flat, instead of being round like that of the *Saperda*, than which it is much more common; indeed most of the mischief done by borers in this part of Canada is attributable to this *Buprestis*, though I am inclined to think that there are more species of the family than one engaged in the work of destruction.

As the mode in which this insect operates is precisely similar to that of the *Saperda*, the remedies to be applied are the same: only it must be observed that as the *Buprestis* does not confine its approaches to the collar of the tree, but places its eggs on the trunk, as far up as the dividing of the branches, the soft soap must be applied to the whole stem; and it has been recommended to place a quantity, wrapped up in a rag, in the fork of the tree, so that it may be dissolved and made to run down over the bark when it rains.

The before-mentioned insects generally choose young and vigorous trees as the subjects of their manipulations; but the third, the *Sirex*, seems to prefer an aged tree, as a nursery for its progeny. It does not confine its attentions to the apple-tree, but lays its eggs indiscriminately on the willow, oak, elm, and other trees, both on the living tree, and on the seasoned timber.

This genus of insects belongs to the order *Hymenoptera* or membrane-winged insects, and is akin to the bee, wasps, and ichneumon-flies. It contains many species, several of which are to be found in Canada, and of which I have six in my own collection. They are all large, stout bodied, four-winged flies, varying from three-quarters of an inch to an inch and a quarter, in length. Their bodies are nearly cylindrical throughout and from the extremity of the abdomen, a stout spine extends about a quarter of an inch in length. On the under part of the body, the female is furnished with a long, strong, ovipositor, with which she inserts her eggs through the bark, or into the crevices of the wood, out of the reach of the jaws of predaceous insects, or the prying eyes of insectivorous birds. The *Sirex gigas*, which is the largest and stoutest of the genus, is distinguished by two broad yellow bands, which cross its dark brown body, one close up to the dividing line, and the other within a little space of the tail-spine. Another species has a number of narrow alternate rings of black and yellow along the whole length of the abdomen, while others vary from velvet black to steel-blue.

The larvæ of all the *Sirex* tribe are provided with jaws of extraordinary power, capable not only of masticating with ease the hardest wood, but also of perforating the softer metals. About fifty years ago, before the fire kindled by the hand of a madman had destroyed a considerable portion of that majestic cathedral, the oaken beams in the roof of York Minster were attacked by the *Sirex gigas*, and when the time came for their final transformation, the grubs were found to have bored completely through the heavy sheet-lead, with which the roof was covered. In 1857, the bullets of the cartridges sent out to the French troops in the Crimea, were found to have been gnawed through by the larvæ of

the *Sirex juvencus*. Again, in 1861, in France, cartridge bullets were found perforated in a similar manner by the grubs of the *Sirex gigas*.

But this extraordinary penetrative power is not the exclusive attribute of the Sirex family. It is possessed in an equal degree by other boring larvæ. Those of Callidium, and other genera of the goat-horn family (*Cerambycidæ*) have been ascertained to possess the same ability to free themselves from a leaden envelopment; and the tiny grubs of the *Bostrichus*, a little brown beetle, allied to the little fellow that makes the small round holes often seen in old furniture, and to that one which excavates the curiously branched galleries, we find under the bark of elms and other trees, have been known to penetrate into stereotype metal, an alloy of lead and antimony, much harder than simple lead, to the depth of two inches. Thus thoroughly has the Almighty provided for the perpetuation of his creatures by the powers and faculties with which He has endowed them.

Besides those I have described, there are two other internal workers, which are not yet established as inhabitants of this country; but as they are numerous in Michigan, Illinois, and other neighbouring States, we may expect that they will spread into our limits, and it is therefore desirable that our gardeners should be prepared to identify them in case they should immigrate into our territories.

The first is called the apple-tree pruner, and is a dull, black, narrow-bodied beetle, about five-eighths of an inch in length, belonging to the same great family as the Saperda, namely, the goat-horn tribe. The female deposits her egg in a tender shoot which grows from one of the smaller branches; the grub, when hatched, easily eats its way through the soft and succulent twig, till it comes to the branch, down which it proceeds to work its way for an inch or two. It next prepares for its exit from its cell, by eating away the wood up to the bark, leaving only as much as is necessary to prevent the branch from breaking off by its own weight. Having done this, it retreats to the upper end of its burrow, and continues to feed, working towards the extremity of the branch, until a breeze of wind agitates the tree, and causes the infested limbs to break off and fall to the ground. If this happens before it attains its full growth, the grub does not disturb itself about its tumble, but, snug in its hole, continues to feed upon the wood until the time comes for it to leave its lurking place, when it digs a hole in the ground, into which it retreats to await its final transformation. The only way to arrest the ravages of this insect, is to visit the orchards immediately after every breeze, pick up all the branches that have been broken off, and commit them to the flames.

The second of these exotic nuisance is a small cylindrical beetle of the Bostrichus genus (*Bostrichus bicaudatus*—Say), known by horticulturists as the apple twig-borer. It is frequently injurious in Illinois, Missouri, and other States, but has not as yet been recognised in Canada that I am aware of. It is stated, concerning it in the "American Entomologist," that "it preys upon the twigs of good sized trees, boring in just above a bud, and working downwards through the pith in a cylindrical burrow, for the space of one or two inches. Both males and females are found in these burrows, and always with their heads downwards, shewing that they bore the hole, not in the larva state, like other borers, but in the perfect beetle state. No larvæ have ever been found therein." It has become common in the orchards of Michigan and Illinois, and may be expected to spread into Ontario. The twigs it attacks mostly break off with the wind, and should be gathered and burned after every gale.

Second Division.

Those which attack the leaves, buds and blossoms.

The enemies which commence their depredations earliest in the season are the cut-worms, so called from their habit of cutting off the stems of young cabbage, tomato and other plants close by the surface of the ground. They are big, fat, greasy-looking grubs, and may fairly be classed among the worst and most provoking pests of our gardens. I have frequently had to plant my cabbages and tomatoes twice and even three times over on their account, besides now and then losing a favourite flower by their insatiate jaws. Under this common term of cut-worm are included the larvæ of several species of the night-flying moths or "millers" (*Noctuidæ*), which pass the winter in underground burrows below the reach of the frost, and issue out in the spring, hungry and ravenous, before vegetation is sufficiently advanced to afford the quantity of food necessary to appease their voracity. During this time of dearth

some of them ascend the trees, especially young trees and dwarfs, and eat off the buds, choosing the fruit buds first, and only falling upon the leaf-buds when the others are exhausted. Their depredations are always committed at night; and at early morning they drop from the branches to the ground, in which they conceal themselves till evening calls them forth again to renew their ravages. No wholesale method of destruction has yet been discovered for these pests. Salt, soot, ashes, lime, soap lye, tobacco wash, have all been tried in vain; the only way to get rid of them seems to be to dig them up and crush them. Wherever a plant is cut down, you may generally find the assassin by digging down carefully about two or three inches with a trowel, knife or pointed stick, when, like other pirates, he will forfeit his life for his villany: but in view of the countless thousands that infest our gardens, this mode of proceeding has but little effect beyond the gratification of revenge, and the best thing we can do is to try to prevent them from ascending the trees until the advance of the Spring-growth is so great as to remove the source of danger. For this purpose, it is recommended to take a sheet of tin, bent to a cylindrical form, and left unsoldered; spring this around the stem of the tree, forcing it about an inch into the soil, and this, it is affirmed, forms an obstacle they cannot surmount—perhaps a piece of old rope coiled round the trunk, and smeared with a mixture of coal-tar and grease, would as effectually prevent their ascent, and, at the same time, be much cheaper, especially if the trunk be thick.

Of all the insects which feed upon the leaves of the apple-tree, the tent caterpillars are the most numerous and the most destructive. Their vast numbers, their great voracity, and their habit of living together in tribes or families, render their ravages a matter of serious concern to the owners of orchards and fruit gardens. There are two species of these caterpillars, the larvæ respectively of the *Clisiocampa americana* and the *C. sylvatica*, and known as the American tent caterpillar and the Forest tent caterpillar. The two species resemble each other very much, the chief observable difference being that the *Americana* has a white *line* extending along the middle of the back, while the *Sylvatica* has a row of oblong white *spots* in the same position. Though both these sorts occasionally attack the apple, the *Americana* is most addicted to that fruit, the *Sylvatica* generally preferring the oak, elm and other forest trees, though it is sometimes found in our orchards.

Happily the habits of these insects render them so conspicuous that their destruction in the early stages of their existence is easily accomplished. The female lays her eggs in June and July, arranging them in the form of a broad ring or hoop upon the slender twigs near the extremity, protecting them from the cold and wet by covering them with a sort of water-proof varnish. The eggs thus deposited remain until the next spring, when they hatch out about the same time that the buds expand into leaves and blossoms. The gardener, therefore, who wishes to save his crop from annihilation, and his trees from damage, must carefully examine the extremity of the branches, and cut off with a sharp knife all those twigs which have the bands of eggs adhering to them, and scrupulously burn them. Every bunch or ring contains over two hundred eggs, which if allowed to remain till May, would hatch out into just so many caterpillars.

As soon as they are hatched they begin to feed upon the varnish-like substance in which the eggs are imbedded; but soon turn their attention to the leaves, which are at that time young, tender and succulent. They unite their efforts to spin a web over a forked branch, which web is so disposed as to form a tent, to which they retire for shelter from rain, and shade from the heat of the mid-day sun. Here they live in common, issuing forth to feed, and when their appetites are satiated, returning to the safe-guard of its folds, guiding their return by a silk line which they spin, and lay along the upper side of the branches. As they increase in size, they enlarge their habitations, until it becomes a conspicuous object as it hangs pendant, like a hammock, from the branches.

As an instance of their destructive powers, I shall here quote a communication I sent to the CANADIAN ENTOMOLOGIST in August, 1872. "About ten days ago, an acquaintance informed me that the fences and sidewalks near the residence of Horace Yeomans, Esq., in West Belleville, were covered by an immense swarm of caterpillars. As I could not well go thither at the time, I sent one of my boys, who soon brought me about twenty specimens of the Forest tent caterpillar—*Clisiocampa sylvatica.*

"At my earliest convenience, some three days after, I visited the spot, and found some of them still clinging to the fence, and, at the same time, a remarkable example of their destructive power. Near the north-east corner of Mr. Yeoman's grounds stands a remarkable

well-grown, full-branched oak tree, about two feet in diameter at four feet from the ground, and rising to a height of about sixty feet; while its branches, extending full fifteen feet from the main stem, overspread a space of over seventy square yards. In the spring and early summer it as usual presented to the eye a dense mass of luxuriant foliage—to-day it does not boast a single leaf: they are all eaten off to the mid-ribs, which still adhere to the foot-stalks, giving the tree a most extraordinary appearance. It is evident that the migration of these caterpillars was occasioned by the exhaustion of their commissariat, which obliges them to seek "fresh fields and pastures new." There must have been several broods to effect such an enormous defoliation, and, indeed, I found specimens of all sizes from two inches down to half-an-inch in length. Another oak, outside of Mr. Yeoman's fence, near the south-east corner of his lawn, is apparently undergoing the same process of denudation."

In order to reduce their numbers and neutralize their mischievous capabilities, it will be necessary besides the spring search for the egg-clusters, to visit the orchard twice or three times in each week during the months of May, June and July and to tear down the webs, taking care to do so when the inmates are at home, and hunting any stragglers that may remain outside through the branches. By the constant and systematic employment of these means, our fruit trees may be protected from their ravages, for their injuries are extremely local, though we cannot hope to exterminate them, or even to materially reduce their numbers, as their numerous "tents" suspended from the trees on the edge of every piece of woods that skirts the roads sufficiently testify. The moth which forms the the imago and the parent of this hateful brood is a short stout "miller," the male of which expands about an inch and a quarter, and the female nearly two inches, across the wings, which are of a light reddish-brown colour, with two parallel lighter lines beginning near the tips of the front wings on each side, converging inwards towards the body and terminating at the inner margin of the front wings. As they are strongly attracted by light and sweets, they may be caught in considerable numbers by placing a lantern at night on a tripod stand, over a shallow vessel of water slightly sweetened with molasses, in which many of them will be found drowned in the morning.

The above is the description of the "American" tent moth. The "Forest" tent moth differs from it in being rather larger, the colour more approaching to red, and brighter, and in having two dark diagonal bands across the wings.

Late in the season, after these pests have been eradicated from the orchard, another tent-maker shows his unwelcome presence in their room. This is the larva of a small white moth called "The Weaver" *(Hyphantria textor)*, which is the parent of the fall web-worm. On the appearance of these caterpillars the cultivator is apt to suppose that the enemies with which he had been contending for months, and which he fondly hoped he had subdued, were returning again to dispute the field, and begins to despair of saving his trees from destruction. But a very cursory inspection will show him that it is a different insect that is troubling him. The worms are black, shaded with blue and green, and have a black line down the back, instead of a white one. Their webs, too, differ from the others, being slighter and more loose in texture, and enveloping the ends of the branches, instead of being stretched across the forks. The remedy is to cut off the web encircled branches when the inhabitants are at home, and burn them and their houses together.

Another enemy which occasionally becomes formidable is the caterpillar of the white-marked Tussock moth (*Orgyia leuco-stigma*). These animals sometimes appear in great numbers, and are then very destructive; but as they do not live in communities, but feed alone, they are not to be dreaded so much as the tent-makers. This caterpiller is rather pretty in appearance, being of a bright yellow colour, with a coral-red head, and knobs of the same colour near the tail. Two long pencils of black hairs project forward near the head, and a similar one stretches backward at the tail. In the Fall of 1872, I found quite a number of these caterpillars on the trunk of a large Lombardy poplar tree on Church street, opposite the Rectory, in the Town of Belleville; but I have not heard of their injuring the fruit trees in this neighbourhood. Where they are numerous enough to be hurtful, the only remedy I know is to hand-pick them, putting them into a pail or other vessel of strong brine. Perhaps a better way is to pick the old cocoons containing the eggs from the trees in the winter, while looking for egg-clusters of the tent moths. They may be known by the withered leaves which always mark their position. (Since the above was written and

read, I have seen it stated that "a remedy for caterpillars, which is used on a large scale in France, consists of a solution of one part of sulphide of potassium in five hundred of water, sprinkled on the trees by means of a hand-syringe.")

There are several other larvæ of night-flying moths (*Noctuidæ*) which prey upon the apple tree, the worst of which are the yellow-necked apple tree caterpillar, the red-humped apple tree caterpillar and the canker worm. The way to deal with these creatures is to observe when any branch is deprived of its terminal or end leaves ; a family of grubs will most likely be found, when the branch should at once be cut off above them and burned—and the tree will not be a bit the worse for the pruning. If they are allowed to grow larger and spread over the tree, the only way to get rid of them is to jar the limbs over a sheet, and kill those that fall.

There is also a large Hawk-moth (*Sphinx Gordius*), whose larva feeds almost exclusively upon the apple tree. It is, however, rare with us, and I have never met with the moth or its caterpillar.

The larva of the largest of our moths (*Saturnia cecropia*) also feeds upon the foliage of the apple tree, among many others which are tributary to its appetite ; but as the insect is scarce, owing perhaps to the attacks of the Ichneumon flies and other parasites, it very seldom does any damage worth mentioning. Where a family of them, indeed, get possession of a tree, they will soon divest it of its leaves : but should they become too numerous in any locality, it will be very easy to reduce their numbers, for the cocoons, which are attached to the branches of the trees on which they feed, without any attempt at concealment, are conspicuous from their size and colour, and can be easily removed in the leafless season, along with those of more dangerous enemies.

There are still the leaf-rollers, a family of small moths, which are in most seasons insignificant, if not totally harmless ; but their works are unsightly, and they can be got rid of by plucking off and burning the crumpled leaves, by which their presence is betrayed.

There are also several other insect species which feed occasionally on the leaves of the apple tree, as the larvæ of the tiger swallow-tail butterfly, and the blind smerinthus, the yellow woolly bear, the American lappel moth, the rose tortrix, the rose chafer and other beetles, and a saw fly.

The last of the leaf destroyers that I shall mention is the *Aphis*, or apple tree plant-louse. This insect seldom does much damage, but occasionally appears in such multitudes as to be seriously detrimental to the health of the trees. Various methods of prevention and cure have been tried and suggested, but syringing with soap suds or tobacco liquor, dusting with lime, ashes or sulphur, and smoking with wood punk and brimstone, though they may have acted as temporary palliatives, have all been found inefficient to overcome the amazing fecundity exhibited by the insect, when placed under conditions which favour its propagation.

The last of the pests which infest the apple tree are the bark lice, which ought to have been mentioned before, as they attach themselves to the branches. There are two species of these insects, one of which, Harris' bark louse is common in Pennsylvania, Maryland and Southern Illinois, but has not hitherto appeared in Canada ; but insects have of late been so frequently introduced along with the plants on which they feed, that it is not improbable that some day or other we may find this one established among us, and we should, therefore, be prepared to recognise it, should it present its very undesirable physiognomy in our gardens. It is of an oval shape with an irregular outline, and of a dirty white colour, it sits very flat on the branch, and somewhat resembles a small fish scale. If one of these be lifted up in the winter, a number of small blood red eggs will be found under it. Its mode of life is very similar to that of the other species, viz :—

The oyster-shell bark louse, which infests our apple trees in every part of the Dominion, and which is stated to have been originally imported from Europe. It is a small egg-shaped animal, about a thirty-second part of an inch long, which attaches itself to the tender part of the terminal shoots, where it forms a scale of the shape of an oyster shell, of an ashen grey colour, under which it continues to suck the sap until it lays its eggs and dies. If the scale is lifted in winter, the eggs it covers are seen to be of a white colour. In the month of June, earlier or later according to the season, these eggs hatch out into a brood of minute lice which, on a hot day, leave the protection of the scale, and run over the branches quite lively, till they find a spot to their liking, where they fix

themselves as immovably as if they were part of the bark itself, and proceed to feed upon the juices of the tree, and to propagate their kind. No males of this insect have ever been observed.

Like most other minute animals, this insect propagates with great rapidity, and is very difficult to eradicate when once it becomes established. The scales can, of course, be, scraped from the branches at any season of the year, but the operation involves a large amount of labour, and, unless very carefully done, is apt to injure the tree. The only time when the ordinary remedies can be successfully applied is at the period when the young lice are roaming over the branches, before they have formed their protective scale. They may then be destroyed by scrubbing the infected parts with a stiff brush, or by washing them with strong soap-suds. A remedy that is strongly recommended is made by boiling leaf tobacco in strong potash lye till it is reduced to a pulp, then mixing it with cold-made soft soap to the consistence of paint and applying it to the branches with a brush. This, if applied early in June, will almost infallibly rid the trees of this disagreeable pest. Caution, however, must be exercised in the use of all concentrated alkaline solutions, for if carelessly applied after the buds have burst, and the leaves begun to expand, they are apt to destroy the foliage, and thus do the very mischief they were intended to prevent.

It is incumbent upon all who are about to plant orchards to scrutinize carefully their imported trees for the presence of bark lice, the eggs of moths, the traces of borers, &c., and particularly to examine the roots to see that they are free from the cotton or root aphis, which, though not yet frequent in Canada, is yet common and very destructive in Pennsylvania and Illinois, where it is known as the Woolly plant louse. This is a duty which every one owes not only to himself but to his neighbours, as our fruit growers have enough of enemies to contend with, without any one allowing by careless—I had almost written criminal, neglect of proper precaution, new and destructive species to be introduced, as too many have already been from foreign localities.

We now come to consider the insects which attack the fruit.

In some parts of the country, where the cultivation of its natural food-plant has been to a great extent discontinued on account of its ravages, the Plum-curculio has transferred its attentions to the apple, pear and other fruits, and has already done considerable damage. As, however, it will be described in its proper connection, I shall notice it no farther here. There is a kindred species, the four humped or apple curculio, *Anthonomus quadrigibus*, which has of late begun to attract attention as a fruit destroyer. In his report to the Hon. Commissioner of Agriculture for 1870, the Rev. C. J. Bethune says of it, "Its natural food is the wild crab-apple and the hawthorn, but it is now taking kindly to the cultivated varieties of the apple. This species may be easily distinguished from the Plum-curculio by its much longer and more slender snout, its colour, which is dull brown, shading into rusty red behind, and by the four conspicuous humps on the wing-covers behind the middle, being brownish red instead of shining black. It makes round holes in the fruit instead of crescent-shaped ones like the Plum-curculio, and completes its transformations in the fruit instead of in the ground." The only remedy against it is vigorous and continued jarring, the method of which will be described under the head of the Plum-curculio.

We now arrive at the last, though not the least deadly of the enemies of the apple crop, the Codling worm, the larva of the *Carpocapsa pomonella* a European importation, which, like other emigrants, has established "a home in the West" for itself. The moth, which appears in June, is nocturnal in its habits, flying by night, and lying concealed during the day. It is rather pretty in appearance, the fore wings being of an ash grey colour, striped and variegated with brown. On the inner angle of each is a large tawney spot, with shining metallic streaks crossing it. The hind wings are plain, of a pale brown colour, and the lustre of satin. The length of the head and body is about three-eighths of an inch, and the width across the wings about three-quarters of an inch. Shortly after leaving the chrysalis the female begins to deposit her eggs, and as she places only one egg in each apple, it is easy to perceive what a vast amount of mischief one moth can do. The egg is placed at the outer or blossom end of the fruit, and as soon as hatched the tiny grub begins to mine his way towards the core, on reaching which he revels in plenty, eating out the centre part, along with some of the seeds. His next care is to make an adit towards the outside, through which he thrusts his castings, which resemble coarse brown

snuff, and through this passage he escapes from the interior of the apple on his arrival at maturity, either after the fruit has fallen to the ground, or while it yet adheres to the tree, by means of a silken thread, which he spins for the purpose. In the space of thirty-six days the grub has become full grown, and entered into the chrysalis state, and in fourteen days more comes out a perfect moth.

The best methods to reduce their numbers are the following: Carefully pick up all fallen apples, and feed them to hogs; or turn the animals into the orchard, and let them eat the fruit as it falls: but as this means will not destroy those which leave the apples while yet on the tree, it will be necessary to place ropes of hay or rag bandages round the stems of the trees, one near the ground, and another up near the fork, when, if the ground be kept free from weeds and rubbish, and the trunks from rough bark, the insects will resort to these bandages for shelter, and there form their chrysalises, and by keeping the bands on the tree from July to the end of the season, taking them off once a week, or oftener if required, and dipping them into boiling water, or passing them through a clothes-wringer, the greater number of those hatched will be destroyed. By pursuing this process from year to year the crops will in time be freed from this very disagreeable depredator; there ought to be a penalty inflicted upon every gardener, whether amateur or professional, who neglects to use these easy and simple precautions against the recurrence of a public loss.

Fruit-rooms and cellars in which apples have been stored, and also the boxes and barrels in which they have been kept, should be carefully examined, as soon as they have been emptied of their contents, for the cocoons of those which had not escaped from the apples previous to their being gathered. The corners of joists, chinks and crannies of walls, joints and cracks in the wood of boxes, and particularly the spaces between the hoops and staves of barrels, are likely places to find them, and should be carefully looked into, so that none of the rascals may be allowed to escape to renew their devastations; and there is the more need for this attention, as the insect is believed to produce two broods in each year.

The pear-tree, though nearly allied to the apple, seems to enjoy a remarkable immunity from the depredations of the insect tribes. The only one that is known as peculiar to the tree is called the pear-tree slug, a disagreeable-looking and foul-smelling animal. It is the larva of a small sawfly, which deposits its eggs in the leaf in the latter part of May, and again in July, there being two broods in the year. They may be easily destroyed by dusting the trees with lime or ashes from a small bellows; this must be done twice for each brood, in June and August. No doubt the tent-caterpillar moth will now and then mistake its way, and deposit its eggs on the branches; a stray borer will dig its way into the stem; or the plum-curculio or the codling worm will find the fruit to their taste; but these seem to be merely chance visitors, and the principal damage that accrues to the pear-tree is from blight, a mysterious and fatal disease with the nature and cause of which no one seems acquainted, but which is believed by some to be owing to fungous growth, and by others to atmospheric or meteoric influences; but which is evidently not caused by any insect, so that it does not fall within my province to discuss the disease and its cure or prevention at present, or to say more respecting it than just this, that the only remedy which will arrest its progress when once established is the instant and free use of the knife, to remove the stricken limbs at least a foot below the place where they are seen to be affected.

NOTE.—The foregoing forms part of a series of papers read before the Murchison Club of Belleville, which, at the unanimous request of the members, are to be published in book form. When complete, the series will include the peach, plum, cherry, grape, gooseberry, currant, raspberry and strawberry.

HYBRIDIZING.

At the autumn meeting of the Fruit Growers' Association, held in Belleville on the 5th and 6th October, some very interesting facts were elicited both at the meetings and at the dinner given by the Horticultural Society to the members present of the Association. I was our intention to give an extended report of the proceedings, together with

the reports of the different committees, but believing that a short *resumé* of those discussions will be most interesting to the general public, we adopt that course.

We may premise by saying that it has been conceded that we have in our vicinity a gentleman who has outstripped all competitors in producing the finest hybrid grape that has yet been grown in Canada. We allude to P. C. Dempsey, of Ameliasburg, who has produced the champion Dominion grape, now known as the "Burnet." This beautiful fruit is a cross between the Hartford and the Black Hamburg, resembling the latter in bunch and berry, whilst the flavour is not much, if any, inferior. It takes after the Hartford in hardiness of plant and earliness in ripening. Our readers are aware that those kinds designated "native grapes," are all crosses between what are called "foreign" and the wild grape of this country. Foreign grapes can only be grown here under glass, for the reason that they are natives of warmer climates with longer summer seasons, and winters whose temperature scarcely touches the freezing point. Several are natives of the Holy Land, such as the Syrian and Palestine, whilst others are of more tropical origin. It was found, in order to obtain a grape for either the Western or Northern States or for Canada, that would flourish in the open air, a mixture would require to be made between these finer sorts and the wild fox grape. This subject has occupied the attention of Horticulturists for some thirty years. The little Delaware has hitherto been the standard of excellence, though the size of berry has been much against it; some of Rogers' Hybrids are exceedingly choice, but their fault chiefly rests in setting thinly on the bunch. Mr. Dempsey's grape, so far as it has been tested, appears to have all the qualities of excellence combined. It sometimes, however, happens that a fruit or flower will do well on a particular soil, locality or exposure, but the dissemination of it over a large area can alone determine its general usefulness. This distribution it is proposed to make in 1878, by giving it gratuitously to every individual who belongs to the Fruit Growers' Association in that year.

The art of hybridizing requires some knowledge of botany and a little delicate manipulation. The female is usually chosen for its qualities as a plant—the male for that of the fruit—because it is found the former takes after the mother, the latter after the father. These being selected by the experience of the cultivator, the first process in hybridizing is to open the flower just before it would naturally do so of itself, and remove the little cap that covers the pistil with a pair of forceps, then take away the male organs or anthers. So soon as the flower buds selected are thus prepared, they must be enclosed in a paper bag until properly suited for the application of the pollen. This may be from one to two days, but sometimes, if the buds are very far advanced, they may be acted on immediately, and again a few days afterwards, which will increase the chances of success. Care must be taken to keep the flower as closely covered over as possible, so that they may not be impregnated except by the hand of the operator. The pollen should be collected in a piece of blue paper by holding it under some flowers and jarring the vine several times, when a shower will fall. This should be quickly rolled up and excluded from the light, and may be kept for weeks to be ready to operate with. This is done by taking up some of the pollen collected on a camel-hair pencil, and applying it gently to the female organ or pistil; as before stated, this operation should be again repeated in a day or two. The flower should then be covered by a paper bag, and when the fruit has formed this may be removed and one of muslin supplied, which should be kept on until the fruit is ripe, so that nothing can carry it away. The seeds should be sown in the autumn, and the next year plants will be obtained a foot in height. These should be taken up and removed to some secure place where they will not freeze, and be replanted again in the spring. Fruit may be expected on these seedlings in from four to five years' time.

Mr. Charles Arnold, of Paris, who was present at the recent meeting, and who by patient labour in this branch of horticulture has distinguished himself as "Canada's great hybridist," has succeeded in raising a new variety of wheat of rare excellence, having the hardiness of some of the thick-skinned varieties, with the thin white skin of the tenderer sorts. He has also crossed the grape, the pea, the apple, the raspberry and the strawberry, of which latter he has about a thousand different varieties, some of them of great promise. His Hybrid Raspberry will be distributed in 1877, with one raised by Mr. Saunders, of London, Ont. This latter is one of the most successful crosses ever made

between any two classes of plants. The varieties are the Philadelphia and the Mammoth Cluster—the former red, the latter jet black. One is propagated by suckers, the other by rooting at the tips of the canes. The new plant has a dark red berry; it does not sucker, but roots itself like the Mammoth Cluster, and is the most prolific bearer on record.

Mr. W. H. Mills, of Hamilton, who was also at the meeting, is the originator of several new varieties of grapes. One—La Viga—was thought so highly of that the Committee awarded it the Directors' prize of $5. Mr. Haskins, another enthusiast of Hamilton, and chiefly known for his Canadian wines, of which he has several thousand gallons maturing, showed some fine hybrid grapes, some of them distinguished for the earliness of their ripening. These will be suitable for the more northern regions, where those we have at present cannot be grown.

After Mr. Burnet's speech at the dinner, Mr. Arnold, of Paris, gave some interesting facts with regard to his experiments in hybridizing Indian corn. He found that by covering the ear of the yellow corn and fertilizing it artificially with pollen from the red, and a few days afterwards by pollen of the white, he produced three distinct kinds on the same ear, and by fertilizing with the two other kinds at the same time he had the three distinct colours in the same grain on the ear. This fact was considered of such wonderful importance—as it has been frequently disputed by French savants—that it was translated into nearly all the Continental languages, and generally copied into the scientific press of the civilized world. It is still true that "a prophet is not without honour save in his own country." Mr. Arnold, though little known in Canada, has a high reputation in the neighbouring Republic, his varieties of grains and grapes being quoted as desirable products in all the catalogues of leading seedsmen.

Although the Society of Fruit Growers has on its roll some two thousand individuals, we believe, were its advantages better known, it would be joined by a far greater number. When it first originated, as Mr. Burnet stated at the dinner, it was proposed to start a farm at Hamilton or St. Catharines, but as no locality, owing to sectional differences, could be selected, it was at length decided to make all Ontario one experimental garden. The wisdom of this plan has long been admitted, as the test of fruits is more thorough, both as regards soil and climate. A practical knowledge is being had of the whole Province and its capabilities for different fruits at various points. The member's fee is one dollar annually, for which some plant or tree, and the annual Report of the Association, fully worth the whole subscription, is distributed to each member. The fee must be paid before the first of March each year, so that the member may get his donation of trees so soon as the spring opens, freight on these packages being prepaid. The subscription may be sent to any of the Directors, or to the Secretary, at St. Catharines. Any one sending his own name and four others, with the cash, will himself receive a double number of trees. His own address should be plainly written, and that of the subscribers, on a sheet of paper accompanying the remittance.

Next year will be distributed the "Glass" seedling plum, originated by Mr. Glass, of Guelph, and by competent judges considered a fruit of much excellence. The Report for the present year will be embellished with a coloured engraving of the *two* Hybrid Raspberries of Messrs. Arnold and Saunders to be sent out in 1877—and in 1 78, as before stated, the "Burnet" grape will be distributed.

The Belleville meeting will long be celebrated for the number and beauty of the specimens of seedling fruits exhibited, comprising apples, pears, crabs, grapes and peaches. The Directors and strangers expressed themselves highly pleased with their visit, and trusted that the next time they meet in this vicinity the weather would be more propitious, so that they might enjoy the pleasure of seeing more of our beautiful Bay and surrounding country.

P. E. Bucke.

Report of Committee appointed by the President to examine Small and Other Fruits on Mr. Saunders' Farm, London.

London, 20th July, 1875.

In conformity with their instructions, your Committee proceeded, on 20th July last, to the fruit farm owned by Mr. Saunders, near London, and beg leave to submit the following Report to the Directors of the Fruit Growers' Association of Ontario:—

The large patch of Philadelphia raspberries, which received and merited the commendations of your Committee two years ago, was found to have been badly winter-killed. The estimate made of this year's return was that there might be about half an average crop. The new stems were vigorous, which indicated that, though the former canes had been destroyed, the roots were perfect, and that the severity of the past winter, which was almost unprecedented, had only injured the exposed limbs.

The Clarke was fruiting, but had suffered much from the winter. This variety, which is generally so early elsewhere, was found to be late on the farm.

Some of Arnold's hybrids were injured about to the same extent as the Philadelphia and Clarke. They had fared neither better nor worse than their near neighbours.

Sable Queen was killed down to the snow line. It had blossomed well; so much blossom, in fact, that its productive force had been expended, and the fruit, as a consequence, was small and poor.

The Kittatinny has made good wood—badly injured, however, by the winter, much to the same extent as Wilson's Early. It was fruiting, though badly killed in the main stems.

Doolittle Black-cap also badly injured; there was some fruit, but not what there ought to have been.

Mammoth Cluster has suffered badly—even much worse killed than the Doolittle.

Another patch of Philadelphia equally badly injured as the former. They seem to have greatly suffered, though reputed hardy in former years.

The Hornet was found not so badly injured as the Philadelphia. The reputation of the Hornet for hardiness has not been so good as that of the Philadelphia, and yet, during the past season, it has really stood the winter better.

GOOSEBERRIES.

The American Seedling had borne a good crop.

SAUNDERS' HYBRID SEEDLING OOOSEBERRIES.

(See the Report of Committee on these seedlings in the published proceedings of the Association for 1873.)

Of these seedlings, so interesting to the hybridist, it may truthfully be said that *they are promising.*

No. 1. Shows large berry, without any appearance of mildew. It is a cross between Houghton's Seedling and Ashton's Seedling, or Bloom Girl. It is a yellowish, plump, round gooseberry—upright grower, good, over medium-sized, round berry.

No. 2. Same cross—promising.

No. 3. Same cross, reddish, large streaked berry—good flavour—oblong shape.

No. 7. Strange, hard berry, the bush showing character of the Houghton. The fruit with Downing cast of character.

No. 10. Reddish berry—slender, upright grower.

HYBRIDS FROM HOUGHTON'S SEEDLING WITH WHITESMITH, AND HOUGHTON'S SEEDLING WITH BLOOM GIRL.

No. 1. Good habit of growth, berry green, medium size.

No. 3. Medium sized white berry—good habit of growth.

No. 2. Downing (female) and Roaring Lion (male), flavour good, large berry.

The following recital of a curious cross may prove interesting to the reading and thinking members of the Fruit Growers' Association. Your Committee found an accidental hybrid, exhibiting in its singular characteristics a clear case of hybrid cross between a wild prickly gooseberry and a smooth cultivated gooseberry. The fruit of the hybrid grew in bunches like the strain of red currants, in this respect showing the style of its wild progenitor. When accidentally hybridized the parents grew together, and the progeny has the habit of both.

Two other curious hybrids were examined, and which afforded subject for thought and discussion. These were artificially hybridized, the cross being between an English

variety and the prickly gooseberry. In one of these hybrids the fruit grew, as in the case formerly described, in clusters—yes, gooseberries in clusters like red currants, with three or four bracts on the stem. One of the hybrids from this cross had its fruit smooth, and the other had it prickly.

Your Committee don't attempt to speculate, but surely there is room in these facts for the development of the most curious speculations by the imaginative and philosophical. The record of these singularities may lead other Saunderses and Arnolds to attempt and carry out similar and more striking elaborations from the exhaustless arcana of nature.

CURRANTS.

The black currants examined were very luxuriant, woody, and highly prolific.

Saunders' Seedling Black Currant, No. 42, formerly noticed two years ago, was not yet ripe. It was a fine sweet variety, fruit about the size of the Black Naples. It is very prolific, and is believed to be a chance seedling.

No. 36 has a very large berry, and is a splendid cropper. This variety caught the firm attention of Mr. A. M. Smith, one of the professional members of the Committee, and that of Mr. Arnold also. It is a good sign of a hybrid to take the fancy of such gentlemen. It may justly be said of this hybrid that IT IS VERY PROMISING. The bunch and berries are very considerably larger than those of the Black Naples. In fact they were very large and fine, and the berries of excellent flavour. We augur that this sort will yet make a noise in the world of horticulturists, and greatly redound to the hybridizing fame of its author, Mr. William Saunders.

Your Committee may again state that the Franconia and Philadelphia, in another part of the field, had suffered from winter-kill much to the same extent as the plants formerly seen and noticed.

HYBRIDS BETWEEN THE PHILADELPHIA RASPBERRY (*Female*) AND DOOLITTLE BLACK-CAP (*Male*).

No. 70. This may be emphasized as Saunders' famous hybrid. (See Report F. G. A., 1873.)

Blossoms were noticed on the new wood of this variety. It has a fruit of great excellence.

No. 69 bears a wonderful similarity to No. 70, and yet is in some respects different. No. 69 is tarter than the Philadelphia. No. 70 is a little more acid than in the Philadelphia and Doolittle combined. The colour of both is purple, that of No. 69 a deep purple. Both are very prolific, No. 69 especially so. Of the two, No. 69 is the best, sweeter than No. 70, and a little earlier. Both are earlier than the Philadelphia by four or five, perhaps by six days.

With no extra cultivation these two varieties maintain all the excellence ascribed on a former visit, and will yet prove themselves an important addition to the resources of horticulturists.

No. 62 is late, prolific, full growth, and of large, coarse foliage. Indeed the foliage of all these hybrids is strikingly large and coarse.

No. 53 is a large, handsome, fine-flavoured berry, fine free grower, and prolific.

No. 40 is a cross between Brinckle's Orange and Philadelphia, good bearer, excellent flavour—retains its formerly asserted good qualities—has hardy, good growth—little injured by the winter, not worse at any rate than Clarke.

Mr. Saunders has been experimenting on the cultivation of pears, and showed us some startling facts. It was found that while a very large percentage of the pear trees had utterly failed and died where the soil had been cultivated, a very much less percentage had died where they were grown in grass. Under the latter circumstance, too, the remaining trees were greener, in better health, and altogether with a fresher aspect.

The windbrake formerly mentioned had evidently grown when your Committee had been sleeping. It was singularly thriving. The Scotch and Austrian pines were in full luxuriance. It was noticed that the silver maple had suckered much from the base. This was quite a feature in trees of this variety composing the fence; the other trees were only noticeable for the wonderful growth they had made.

It may be stated that of all the fruit trees on the farm, there were none that could in any way compare to the thrifty and luxuriant growth of the apple trees composing the orchard. This was especially to be seen when the peach and cherry patch were reached. The peach trees have disappeared, and the same may almost with equal truth be said of the cherries.

The plums generally were good, bearing fair crops; some varieties heavily loaded; others again were dying, and some had died. Having spent a most agreeable day peering into the secrets, and examining some of the manifestations of Providence in the vegetable world, we had sundry peeps, through Mr. Saunders' splendid glass, at the wonders in the heavens, as exhibited by the planet Jupiter and his moons and belts; at Mars, with his hoary poles; at the moon, with honeycombed surface; and at Saturn, with his resplendent rings and accompanying moons. Verily it is not to be wondered at that the President monopolizes the duties, privileges, and sweets of these examining committees—it would be strange that it were otherwise. A taste of the joys of the social intercourse to be found in the latitude of London only whets the appetite for a repetition of the same delightful, ever-varied and instructive society.

All which is respectfully submitted.

A: M Smith,
Charles Arnold, } *Committee.*
Robert Burnett,

Paris, 19th July, 1875.

Arnold's Grounds.

The Commtitee appointed by the President to visit and report on Mr. Arnold's raspberries and other hybrids and fruits beg leave to submit the accompanying Report:—

Your Committee met on the above date at Paris, and examined the grounds of Mr. Charles Arnold. The first fruit that attracted their attention was Hart's Seedling Gooseberry, said to be a seedling of Whitesmith, about two-fifths the size of parent. A handsome berry, being slightly oblong, apparently free from mildew; bush, a very drooping habit, which would be a slight objection to it; heavy bearer; has mildewed slightly with Mr. Hart.

Arnold's seedling, an upright grower—a seedling of Downing, slightly hairy, a little larger than Downing, and we believe will prove a promising variety, well worthy of more extended cultivation—has fruited for six or seven years—has never, with Arnold, shown any symptom of mildew.

Examined Arnold's new seedling strawberry; a little tender; admirable flavour. At this date still bearing; the berries began to ripen the last days of June.

Arnold's new seedling raspberry, Diadem, is a cross between Orange King and Hornet. Colour of Brinckle's Orange, but larger. Flavour excellent, very similar to Brinckle's Orange; a very robust grower and excellent bearer; much more productive than Brinckle's Orange. The bush has a remarkably bushy habit; foliage large and rather coarse. Ripens about the same time as Brinckle's.

No. 6. Very large, fine, red berry, of fair flavour, with a grateful acidity; appears to be hardy—has proved hardy thus far with Mr. Arnold, in a northern exposure, where, during the last winter, several of his cherry trees, which have stood many years, have been killed. Foliage large and rank; seems to be a robust grower. Season from middle to last of July. A heavy bearer, fully equal to Clarke in productiveness, but much larger.

No. 7. Also a very large berry, with very large grain; flavour good, slightly acid; foliage large and good, but scarcely so vigorous as some of the other seedlings.

No. 2. A very fine berry, with good flavour; much larger than Clarke; an immense bearer, a large proportion of the berries growing double; foliage scarcely so coarse as some of the others, but large and good.

No. 3. An immense large berry—very productive—good flavour and moderately firm, but has thus far proved a little tender with Mr. Arnold.

Your Committee had a double experience with Mr. Arnold's new Hybrid Pea. First in the grounds, and secondly at the hospitable board of Mr. Arnold. This new pea is a cross be-

tween Champion and McLean's Little Gem—a dwarf pea, an excellent bearer, and of fine quality.

No. 8. The latest of all Mr. Arnold's seedling raspberries; its season is from the 20th July to the middle of August. Fruit dark red, very large and firm. Flavour good, but scarcely so good as No. 7; would, we believe, market well. Foliage large, dark green—a robust grower, but scarcely as heavy a bearer as No. 7.

No. 4 is also a very fine red berry, but we fear will prove tender.

All which is respectfully submitted by—

W. Saunders,
A. M. Smith,
Robert Burnet, } *Committee.*

Report of the Committee on Glass's Seedling Plum.

Having received the following communication from Berlin, it was answered by putting in a personal appearance. We beg leave to submit the following Report:—

Berlin, 19th July, 1875.

Rev. Robert Burnet,
President Ontario F. G. Association.

Dear Sir,—Understanding that there is considerable dissatisfaction among the members of the Association relative to the Glass Seedling Plum, some asserting that it is identical with the Quackenbush, and others that Glass has no claim to it as the originator, I, as a disinterested party, beg to inform you all I can glean concerning the matter in question. There is no mistake that the tree in general appearance does resemble the Quackenbush in foliage and habit of growth, as do almost all plums of the Damson class—having the thick shining leaf peculiar to all vegetation bordering on the Mediterranean; but the Quackenbush, as it has fruited with me, does not attain half the size of the Seedling; in shape and colour they are alike. I have at present the two varieties in fruit, the Seedling worked on the Canada plum at the ground, and one specimen worked at standard height on an English Magnum Bonum, which is worked on the ground on the Muscle stock. The Quackenbush is in the nursery row, and worked on the Canada plum. Now, if any of the members of the Committee appointed to investigate the matter would take the trouble of visiting my grounds they will get *prima facie* evidence to guide them in their judgment in making their report In and around Guelph I do not think that there is a tree of either variety in fruit this season, as far as I could see in the grounds of Mr. Allan or Mr. Goldie. (Mr. Elliot's I did not visit.) I think from the appearance of the tree that it may be from 15 to 20 years old. Now, at the time it was said to have baen obtained from Mr. Leslie, Toronto, the Quackenbush plum was held in monopoly by a nursery firm in Schenectady, N. Y., who sold the trees at $2 each; therefore it is not likely that Mr. Leslie would risk such a price for a tree new in cultivation at that time. It also appears that the tree was grown in close proximity to a horse-chesnut, but was subsequently removed. It certainly does not appear to me to be at all likely that a $2 plum tree would be planted by a professional man quite so close to a vigorous growing ornamental tree, there being abundance of room in the garden. An amateur might make such a mistake. Mr. Allan is a gardener himself, and would soon have ordered its removal. I am sure at least of one thing, that in so far as the public are concerned, the distribution of the tree (let its origin be what it may) will be an acquisition, and I think the best value of anything given out yet by the Association. I have heard it stated that the original tree is a shy bearer. This may be true, and it is not unlikely that it should be so. In all my experience I find that alluvial soil, such as forms the garden of Mr. Allan, is just the very worst, either as regards the health of the tree or its fruiting qualities. The state of the trees the present season on alluvial bottoms generally is proof of what I assert. With me, the trees, of which I have three grown under different circumstances of propagation, are all full of fruit—the situation very high, and a hard stiff clay. As to the hardy character of the tree, I think there is no better evidence than that illustrated on the grounds of Mr. Goldie, Guelph, where every other variety excepting it and the Fulton are destroyed at the

snow line on the south side of the trunk—some partially, some entirely. I saw the original looking quite healthy, but with few or no fruit, and on the grounds of Mr. Webster, Registrar, I observed a fine healthy young tree of the variety.

The fruit crop in and around Berlin is a fair average. Plums abundant with those who were careful. Apples, pears and cherries plenty, and in small fruits an enormous yield.

I practised with success the hints thrown out in your last address by jarring my plum trees when in blossom. The fact is that we have delayed too long in commencing the jarring, hence the results of defective crops the present season. Not one-tenth of my crop has fallen compared with former years under the old system, although performed carefully.

If the Association will require samples of plums for exhibition purposes, I think I must have some 30 or 35 varieties in fruit—too many for practical growing.

Hoping to be able to attend some of the meetings to discuss the blight question,

I remain, yours,

SIMON ROY.

In August, 1875, I visited Mr. Simon Roy's garden and nursery; found the place in grand feather, perfectly clean and tidy. The plum crop was something enormous; from careful jarring the curculio had been conquered. The fallen fruit was all gathered and placed in crocks, and covered with lime and water. The pears were also looking well, and the apples gave promise of a good crop.

I examined the tree of Glass' seedling, which was in bearing, and compared it with the Quackenbush, and found them both in trees and fruit entirely different. Have received from Mr. Roy samples of the fruit of Glass' seedling, and find that though in some respects it resembles the Quackenbush, it nevertheless is markedly different, and ripens a month later.

The quality of the plum will rank as "good." The flesh is sprightly, juicy, somewhat coarse-grained, with a pleasant, slightly sub-acid flavour.

As a cooking plum it proves to be first rate. The skin parts readily from the flesh as soon as it has been subjected to a little heat, and can be easily removed, while the flesh of the fruit is sufficiently firm to retain its form perfectly. The colour is so deep that it gives a beautiful tinge to the preserve. The flavour even seems to be improved by the cooking.

The Directors will have great satisfaction in disseminating this new, beautiful, and truly valuable variety.

ROBERT BURNET.
D. W. BEADLE.

REPORT ON MR. JOHNSTON'S SEEDLING RASPBERRY.

Accompanying a box of fruit, I received the following communication :—

CAMPBELLFORD, 29th July, 1875.

I send you a box of a seedling Black-cap, raised by myself. This is the third year of fruiting. It is much superior to Mammoth Cluster in size and quality with me, and growing with much less care near Mammoth Cluster, is decidedly more productive.

The robins, however, are hard on the seedling, and I had much pleasure in saving these for your inspection.

All information will be sent if needed.

Yours truly,
J. W. JOHNSTON.

This was found to be a superior berry. It was submitted to the Seedling Committee —their desire was to see more of it. The foliage was good, and there was every indication of its being a prolific variety. Size scarcely equal to Mammoth Cluster, as grown at Hamilton. Flavour good.

ROBERT BURNET.
PETER MURRAY.

REPORT ON MR. ELLIOTT'S GOOSEBERRY.

11th August, 1875.

Received from George Elliott, Esq., Guelph, a package of red gooseberries, of good flavour, said to be prolific ; superior to Houghton or Downing's seedlings ; no appearance of mildew. Not known to be a cultivated variety ; they seem to be a chance cross.

R. BURNET.
PETER MURRAY.

REPORT ON J. D. EVANS' BLACKBERRY.

Received a box of fruit on the wood, and submitted them to the Seedling Committee.

Mr. Evans says that "the plant is a creeper, running flat on the ground, and thereby escapes frosts ;" that he has "fruited it for three years and found it a certain cropper."

The berry was small, the flavour fair—resembling the common blackberry. Evidently very prolific. From the slender growth of the wood and its wild appearance it must creep on the ground, and is not unlikely a variety of the Dewberry. It ripens early, the 11th of August, but we do not esteem it of any great acquisition.

R. BURNET.
PETER MURRAY.

REPORT ON HIGH'S SEEDLING PEACH, RECEIVED FROM ALLEN MOYER, JORDAN.

Got six specimens in good condition. The fruit is high coloured, dark red in the sun, greenish yellow in the shade, size medium, flavour very good, flesh firm, clingstone, ripens very early, 11th of August, worthy of further trial.

ROBERT BURNET,
PETER MURRAY.

REPORT ON D. HAMMOND'S SEEDLING APPLE.

I received some apples from Mr. Hammond, which he says grew on a Seedling tree of his own raising, and which has an upright habit of growth, and he thinks likely to be a good bearer.

The fruit was fair in appearance, light yellow with red cheek, quality medium.

ROBERT BURNET.
PETER MURRAY.

REPORT ON MR. CANNON'S SEEDLING PLUM.

The following letter, accompanied with a box of Seedling plums, came duly to hand :

ANNAN, 9th September, 1875.

REV. SIR,—I have sent you through parcel post a few Seedling plums, which you will please examine, as I would like to compete for the best Seedling for this year. Believe they will be a very good market plum on account of their size and good carrying quality; raised the tree some seven or eight years ago ; it has borne fruit for the last three years. they are not so large this season as usual, being grown on very light land, in fact pure gravel, and the summer in this section has been one of the driest we have had for a long period ; the tree is a very strong, quick grower, very hardy, and seems as if it would be a good equal bearer, not being overloaded, but having a good fair crop every year—have

suckers planted out from the original tree, one of which has a few plums on it this year, the fruit being exactly like the other.

Your obedient servant,
JAMES CANNON, JR.

We are not able to see any great excellence in this Seedling fruit—there are so many varieties of superior quality already in cultivation, that there seems scarcely room for new varieties except they are of superior merit.

R. BURNET.
PETER MURRAY.

REPORT ON SEEDLING APPLES RECEIVED FROM JAMES ANDERSON, EAST ZORRA, WOODSTOCK.

Mr. Anderson says, some years ago he planted a few seeds from a Siberian crab-apple, thinking to raise a large size of Siberian crab. Three plants came up; two of them were destroyed, and the third bore the fruit which he sent to the secretary.

The tree blossomed last year for the first time, but did not bring any fruit to maturity. This year it bore about a hundred specimens. The fruit when received was not sufficiently ripe to enable us to speak positively of its quality, but the evident presence of water-core is indicative of a variety of no great promise.

D. W. BEADLE.

REPORT ON TREES AND PLANTS RECEIVED FROM THE ASSOCIATION.

GALT, October 18th, 1875.

Eumelan Grape grows well, is hardy and ripens its fruit every year. Quality, fair.

Beurre Clairgeau Pear has made a good growth of wood every year and borne a crop of pears of fine large showy fruit, and quality juicy and melting. The McLaughlin Plum died the first year.

Clapp's Favourite Pear are making a fine healthy growth of wood and are a perfect model of tree. Grimes' Golden Pippin is making fair growth of wood.

Downing's Gooseberry grew well and bore fruit this year, 1875; but the berries when half grown all mildewed very badly; so did the Whitesmith and another variety which I don't know the name of; shall try gooseberries once more, and if they don't do better, out they must go.

Salem Grape grows well, but have older vines of this variety; is hardy only by throwing the canes of the vines on the ground and pegging them down so that the snow covers the vines in winter. The fruit of the Salem is of great excellence and good flavour, and very large bunches, often shouldered, and well worthy of cultivation, ripening this year, 1875, on the 14th of September. Rogers' No. 3 ripens first of all varieties; with me it ripened this year on the 8th September, a grape of pure excellence.

Swayzie Pomme Grise and Flemish Beauty Pear, received from the Society this year, made young wood of about eighteen inches.

JAS. W. SCOTT.

REPORT OF TREES RECEIVED FROM FRUIT GROWERS' ASSOCIATION.

Oct. 5th, 1875.

DEAR SIR,—I became a member of the Fruit Growers' Association in 1873, and received that year Grimes' Golden Pippin Apple and Clapp's Favourite Pear. They were both received in good order and made a very good growth the first summer. The apple

tree winter-killed to the snow line the first winter. This summer it has formed a new top on a shoot that came out of the old trunk about two inches from the ground. I wound the pear tree with wrapping paper from the ground to the limbs; it came through the winter without much injury, but it winter-killed to the snow line last winter, and formed a new top close to the ground this summer, and has made a good growth.

Last year I received in good order by mail the Salem Grape and Downing Gooseberry; they are both growing, but the vine, from some cause unknown to me, is not doing very well. The gooseberry is growing splendid, sending out shoots this summer two feet long, and brought to perfection a dozen or more fine berries.

This year I received the Flemish Beauty Pear and S. P. Grise Apple. These trees came quite late in the season, having been delayed some place on the route here. The roots were quite dry when received, but I took particular pains in planting, and moistened the roots well; they were very slow in starting, but for all have made a good growth this season.

I intend to dig up the Pear tree this fall and bury it root and branch, and plant it again in the spring; I intend to continue this mode of treatment for three or four years. Pears cannot be raised in this part of Ontario without shelter; I have tried nine of what is considered the hardiest variety of pear, and all have proven to be too tender; it is only wasting money and time to try to raise pears in this climate; they will grow well, but the climate is too severe for them.

I have tried over thirty varieties of apples, and three-fourths of all of them have been too tender for this climate. There are, however, quite a number of varieties that can be successfully raised in this country—viz., Talman Sweet, Golden Russet, Red Astracan, St. Lawrence, Duchess of Oldenburgh, Fameuse, Northern Spy, Ribston Pippin, and Brockville Beauty. The hardiest of these is Talman Sweet and Golden Russet; these two I consider equal to the crabs for hardiness. I have been travelling four years in most every part of this country, and have never seen or heard of either of these two varieties being injured by the winters. There may be many others that will do well here, but the above varieties I am acquainted with, and can recommend as being suitable for this county. I have planted some more varieties this spring that is said to be hardy, viz., Ben Davis, Tetofsky, Fourth July, Wallbridge, Pomme Grise, Prolific, Pewaukee, and Peach Apple of Montreal. These varieties are all new to me, and I cannot say anything about them.

The varieties that I have tried and proven too tender for this climate are: Early Harvest, King of Tomkins County, Sweet Bough, Jersey Sweet, Goyeau, Alexander, Colvert, Fall Pippin, Hawthornden, Hawkins' Pippin, Twenty Ounce, Baldwin, R. I. Greening, and Wagener; those that have proved very tender, and are entirely gone up with me, are Early Harvest, Jersey Sweet, Goyeau, Alexander, R. I. Greening, and King of Tompkins County, which is the tenderest of the whole lot; the Alexander is classed with the hardy varieties in Mr. Dougall's catalogue, but it has proved very tender with me and with one of my neighbours. I have the Baxter, Belflour Yellow, Roxbury Rusett, and Canada Red, not sufficiently tried.

I set out a few plum trees in 1871; they get injured more or less every winter; the Lombard is the hardiest of any I have; that has not been injured much, and is a very superior grower; it grows shoots four and five feet long some seasons. I have a Smith's Orleans that grew a shoot eight feet long by measurement in one season. I have had no fruit on any of my plum trees yet; the soil here appears to be suitable for fruit trees, but the winter is too severe. I have apple trees planted this spring that have grown two feet this season.

I have never lost a tree from any cause but one—viz., winter killing. The apple-tree borer is very bad in this county. I washed my trees with soda water this summer, and I think it has had a good effect, as I have not found any borers in my trees this season. I put in one pound of sal soda to one gallon of soft water. I thought it was too strong, but it did not injure the trees any.

A. Bridge, P.M.,
West Brook P. O., County Frontenac, Ont.

The Secretary F.G.A.,
St. Catharines, Ontario.

A THREATENED EVIL TO APPLE-GROWING.

SARNIA, 2nd July, 1875.

DEAR SIR,—There is an army of tree peddlers from Bloomington, Illinois, scouring this part of the country at present, and because the importation of apple trees from that country may very injuriously affect fruit-growing interests in the Dominion, I would respectfully beg leave to call your attention to the matter. It is said that in Illinois there is a very destructive insect which infects the roots of apple trees, and that it has ravaged parts of Illinois to such an extent that the cultivation of that fruit has been abandoned, and it may be that the want of a market in consequence of this failure has driven the peddlers here. When potato beetles invade the country there appears to be nothing for it but to let them come. But here is a threatened evil which there may be a means of preventing. France has, very properly, I think, taken means to prevent the introduction of the American grape on account of the pest which accompanies it. Ought not Canada to be equally watchful when there is danger threatened?

I think, therefore, my dear sir, that you, as President of the Fruit Growers' Association, might very properly call the attention of the Directors to the matter, and there can be no doubt that if the Government of the Dominion were appealed to by the Association it would, at least, cause an enquiry to be instituted, and, if the case is as I fear, the proper remedy, or rather precaution, can be applied.

I am, dear Sir, very respectfully,
Your obedient servant,
HUGH SMITH.

Rev. R. Burnet,
President Fruit Growers' Association,
Hamilton, Ont.

FRUIT CULTURE IN ENGLAND.

We copy from an American correspondent the following interesting and readable matter touching two remarkable exhibitions of fruit, which took place near London in the fall of 1875. It goes far to show what scientific method may accomplish in overcoming the uncongenial forces in nature which English promologists have to contend with in the production of fine fruits. It seems absolutely needful to the production of the finest flavour in fruits, that a certain degree of dryness in the atmosphere, acccompanied by an average sunlight, should prevail; conditions which our mother land can scarcely be said to enjoy in common with some of her American colonies. Yet, what nature has endowed our climate with, Englishmen try to secure by indomitable pluck. How far they succeed, the members of the Fruit Growers' Association of Ontario may infer from the following article, which, although the writer in one part seems inclined to be facetious, may be taken as a fair declaration of facts:

LONDON, Sept., 28th.

Two grand Shows have just been held in the Crystal Palace and the Alexandra Palace for the display of England's best fruit, flowers and garden vegetables. As I was confident that a truthful report of the prominent features of these exhibitions would prove acceptable to a portion of your readers, I was a daily attendant at both places, and below I give you the result of my investigations.

GRAPES.

The display of this fruit was large and magnificent, both in beauty and flavour. There were single stems of the Black Hamburg exhibited that could not be pushed into an ordinary stove-pipe hat without displacing some of the fruit. These were cultivated on the south side of high brick and stone walls.

PEACHES.

Of this fruit there was a very small display in quantity, but the specimens were as beautiful in size and colour as any I have ever seen. Some of them were three inches in diameter, but they lacked the flavour of the Delaware fruit. Nearly all of the specimens exhibited were raised from budding into the Mussell (a kind of bitter, small and hardy wild plum), and were all trained like vines up the south side of high walls. Old fruit raisers say that while the cold, clammy climate of England is destructive to a peach tree if exposed to the chilly currents of the humid atmosphere, yet if the tree is protected by a high wall, the fruit, though inferior in flavour to the American, is peerless for size and beauty. The specimens taking premiums for size, beauty and flavour were the Royal George, a deep, transparent red; the Prince of Wales, a light cream; the Exquisite and Early Crawford, both a rich yellow; and the Berrington, a deep shaded red, with blushing spots of almost purple hue.

The nectarines were few in number at both exhibitions, but of magnificent size and colour. The recipients of prizes were the Violetta, a dark purple; the Victoria, light yellow and very large; and the Rivers' Pineapple, of a warm yellowish tint, with small red spots of the size of pin heads, The fruit was all raised on the southern side of walls, and from buddings into the Mussell. Though superior to the American in size and variety of beautiful tints, it was all inferior in flavour. It is evident that by the highest degree of scientific cultivation, peaches and nectarines have here been worked up to the most perfect condition of size and beauty; but they require a hotter sun and a drier climate before their best flavour can be developed.

PLUMS.

The variety of this fruit exhibited was very great, including over fifty different kinds; while in point of tenderness and flavour some of the specimens were superior to anything raised in America. Where so many varieties of excellent quality were exhibited, it required a long time and a critical palate to fully decide as to the relative merits, but the kinds which took the prizes and which seemed really above criticism, were the Victoria, a dark purple of the size of an ordinary hen's egg; the Goliath, size of a very large egg and shaded purple; the Warren Golden Drop, size of a small egg, bright yellow and very luscious; Transparent Gage, a milk-white of medium size; Magnum Bonum, of two colours, creamy yellow, both of fine flavour, and each claiming to be the "original Jacobs;" the Washington, a transparent flesh colour of medium size; and the Jefferson, egg size, and spotted with yellow and purple. For beauty this plum stands unrivalled, though I think the flavour is hardly up to the Warren Golden Drop. Plums are raised in large orchards, and every tree is budded. The English pomologists prefer this to grafting, as they say it is more reliable in this climate. The buds are sometimes inserted into this wild Mussell, but as a general thing into the common plum.

PEARS.

The display of this fruit, both for variety and quality, was very fine, including over fifty kinds, from those of the size of a large cherry to the weight of one pound each. The largest and handsomest were from the Isle of Jersey, but none were exhibited having any better flavour than the King Williams, which are raised by nearly every gardener in England. These "Williams"—as they are called for short—have a flavour somewhat similar to the American "Bartlett," but they are a little more astringent, and a third longer. They are hawked about the streets in London by the fruit peddlers, who sell them according to size and condition from four cents each, down to four for a cent, and about twice a minute make the walls echo with their resonant yells of "Ere's yer Wilyums." All good pears in England are the result of budding. The natural fruit is wrinkled, tough and speckled. The handsomest and best for market are from buds inserted into quince stocks; but the best, the richest in flavour, are from buds inserted into the pear itself. Professional gardeners, who raise fruit for market, almost invariably bud into the quince, both for size and beauty of the fruit, and because it can be raised quicker, taking

but three years; but gentlemen who raise pears for their own table prefer pear stocks. From conversations with a great many different people, I am led to believe that the pomologists of England study the science of fruit-raising far more than we do in America. The soil of a field or farm is carefully analysed before deciding the kind of fruit to cultivate. A loam containing a strong percentage of clay is devoted to apples and plums, while a sandy loam is selected for peaches, nectarines, pears and cherries. By carefully obeying this rule, fruit can always be attained that is both large and tender.

APPLES.

I doubt if the amount of this fruit at both Shows exceeded five bushels. The competitors generally exhibited from one to three dozen single apples, carefully culled from their entire stock, with especial reference to size and beauty. English apples bear a strong resemblance to those raised in Oregon. The natural fruit is small and tough, with a bitter astringent flavour, while the cultivated is fair, tender, coarse and tasteless; something like apples that have been buried in a calcareous clay during a long open winter and are dug out in March, devoid of all that sharp, sparkling acidity which has given a world-wide reputation to the American apples raised east of the Mississippi, between the fortieth and forty-fifth line of latitude. This in a large degree, no doubt, accounts for the fact that apples are not used as an article of food in England. I have never seen an Englishman eating one away from the dessert table, and families seldom buy them in larger quantities than ten or twenty pounds. Among the best exhibited (buds from which I hope soon to see growing in America) were Peasgood's Nonesuch, looking like the latest specimens of the Northern Spy that are raised near Rochester, N. Y.; Cox's Pomona; Stone's Pippins; Emperor Alexander; and a small, round, reddish apple called Nonesuch. The farmers appeared to feel proud of their large display of apples, and a number of them asked me if we could raise such fruit in America. It reminded me of a flock of game fowls proudly clucking over one chicken, and that afflicted with one blind eye and a broken leg.

At the close of the two Shows I took a friend's advice and paid a visit to the farm, orchard and garden of Wm. Warren, Esq., in Isleworth, Middlesex county, about twelve miles to the south-west of London. Mr. Warren has a large garden of level clay loam soil, on which stands over 25,000 apple, plum, pear and cherry trees. Between all the rows of trees the soil is devoted to strawberries, raspberries, blackberries, gooseberries, currants and tomatoes. He employs about one hundred hands in cultivating, picking, culling, and packing fruit for London, where, in Covent Garden Market, Warren's baskets command the highest price without examination.

On making the object of my visit known, Mr. Warren received me with the utmost politeness, and kindly detailed his son to show me through the entire garden. Mr. Warren is the originator of the famous Warren Golden Drop Plum, and in the cultivation of the best qualities of fruit he has acquired an extensive reputation. He informed me that the present year has been the most prolific that has been known in England for ten years. It has, consequently, been highly satisfactory to the great mass, but less profitable to the professional fruit raiser and the general dealer, owing to the exceedingly low prices.

We are quite satisfied that the fruits of a country can safely be taken as a fair and truthful equivalent of climate, sunlight and soil, and that no better guide could be offered to Europeans wishing to settle in America than a fair and truthful exposition of its fruits, and would therefore recommend our Canadian Government to strike off some thousands of extra copies of the Annual Report of the Fruit Growers' Association for 1875, for free distribution at the forthcoming Centennial.

REPORT OF THE COMMITTEE ON ESSAYS.

Your Committee received only one essay on the Cultivation of the Cherry. It is evident from the essay that the writer is a resident of the colder regions of our country, and is there-

fore only acquainted with a limited number of varieties; hence the information conveyed will be valuable only to those residing in a like climate. We therefore award it the second prize.

There are four essays on Where and How to Market our Fruits.

The essay bearing the motto "Perseverantia" is entitled to the first prize.

The one bearing the motto "Qui docet, discit," the second.

It is matter of regret that there is no third prize offered, as the essay bearing the motto "Excelsior" is deemed of such value as would entitle it to rank third. On account of its excellence they recommend that it be published in the Report.

Three essays were received on the Cultivation of the Pear.

We have awarded the first prize to the essay bearing the motto "Virescit vulnere virtus."

The second, to the essay accompanied by the motto "A well-grown and properly ripened pear is a delicious fruit."

A third essay, bearing the motto "Tongues in Trees," possesses so many points of excellence that we recommend it to be published in the Report.

All which is respectfully submitted by

W. Saunders,
Chairman of Committee.

SECRETARY'S REPORT.

To the Directors of the Fruit Growers' Association of Ontario.

Gentlemen,—Having received the award of the Committee on Essays, I proceeded to open the envelopes bearing their respective mottoes, with the following result: The essay bearing the motto "Virescit vulnere virtus" was written by the Rev. Robert Burnet, Hamilton. The one bearing the motto "A well-grown and properly ripened pear is a delicious fruit," was written by John McAinsh, St. Mary's. The one bearing the motto "Tongues in Trees" was written by George Mill, Warwick.

The essay with the motto "Fruit the noblest gift to man, save woman," was written by P. E. Bucke, Ottawa.

The essay bearing the motto "Perseverantia," was written by Linus Wolverton, Grimsby. The one accompanied by the motto "Qui docet, discit," is written by the Rev. Robert Burnet, Hamilton. The one with the motto "Excelsior," is written by George Peacock, Mount Salem.

All of which is respectfully submitted by

D. W. Beadle,
Secretary F. G. A.

St. Catharines, 12th Nov., 1875.

FIRST PRIZE ESSAY ON THE CULTIVATION OF THE PEAR.

"*Virescit vulnere virtus.*"

By Rev. Robert Burnet.

Few subjects can present a more attractive caption than the one at the head of this paper, the Cultivation of the Pear. Pear-culture has formed an agreeable and elevated pastime from time immemorial. Ancient and modern cultivators have been loud in its praises—a ripened and luscious pear agreeing with almost the taste of everyone. Of late years in our Province pear-culture has formed the staple of discussion among fruit-growers, as much almost as the apple itself, and there have not been wanting votaries who have given it undivided attention. It is a fascinating pursuit, and the longer indulged the more fascinating it becomes. The multiplicity of varieties, and the ease with which the most

tender varieties can be cultivated, give to pear-culture a zest and a pleasure almost unknown to common fruit cultivation.

Rapid strides have been made in Canada during the last twenty-five years in growing pears. The experience and wisdom of the American fruit-growers have been made our own, and importers into our Province have been guided greatly in their choice of varieties by the admirable selections of our neighbours. Our pear-culture, therefore, has been from the first mature. The best has been planted, and with rare exceptions the issue has been the best of fruit.

Our Western Province is singularly well suited for pear-culture. The temperature is moderated by the greatness of our lakes, and the parallel of latitude in our southern sections is perhaps the most suited of any for its cultivation.

Nor is the right quality of soil a-wanting. Indulging as it does in all kinds of soil, from the stiffest clay to the lightest sand, the pear has ample scope for its likings in the diversity of our soils. As a rule, it is true, it delights for the most part in heavy clay, though varieties of pear are not wanting which delight in almost pure sand. We are inclined to recommend for pear-culture a well drained, well pulverized heavy clay. The trees may be difficult to start just at first, but when once rooted and accustomed to their location they thrive well and yield well. Draining is an absolute necessity. Little or no satisfaction can be obtained in pear-culture apart from draining. It is more essential than manuring the land, though this latter is not to be overlooked. Some pears are gross feeders. Take the Seckel for an example. One can scarcely overfeed the Seckel. The more it is fed, the better the fruit.

When young, pear trees require a different cultivation from that when they have begun to fruit. Mangel wurtzel, turnips, potatoes may be profitably cultivated for some years after the pear trees have been set out; every year, of course, and with every culture, giving a good barnyard manuring, and keeping the ground loose and friable. Under this kind of treatment pear trees do well. We have raised splendid mangel from our pear patch, good turnips and excellent potatoes.

When the trees begin to fill up the spaces allowed and intended for them, top-dressing with ashes, leached and unleached, phosphates, lime, bones, &c., &c., are desirable. After an application of leached ashes I have invariably found the fruit free from spots, comparatively free from gnarling, smooth in skin and of excellent flavour or quality. All applications of such sort of manure are sure to give a good return both in quantity and quality. For years we have, every second or third year at the most, covered our garden to the depth of three or four inches with ashes. The growth of the trees, the fairness of fruit, have both testified to the success attending this mode of cultivating the pear. We are satisfied that it advances the health of the tree; and if the health, then also the vigour of growth and fruitfulness.

The question of keeping and ripening the fruit is becoming of primary importance.

The pear, like all valuable and cherished articles, is difficult to keep. Some are so chary of keeping, that a day beyond their period of ripening, and they are worthless and indifferent. Who has not suffered in trying to keep a Brandywine one day beyond the mark? A more luscious pear there is not when—and only when—ripe, but one day over-ripe and you will none of it. There is a plan for keeping which is the best we have yet tried, and if anybody knows a better—well, let it be told. Pears, like apples, rejoice in a cool, equable temperature—to keep them long, it is essential to have a cool cellar. Care has to be taken with regard to the time in which pears are to be cellared. Most people rush them into the keeping-room straight off the tree. Fruit should remain on the ground a few hours or days, as the case may be, after they have been gathered; placed first in an open outhouse, allowed to remain there till the first frosts admonish that the cool cellar is the place to successfully resist the rigours of climate. Then they are to be stored in barrels, closed and tight. The period of the ripening of each is pretty well understood and known, though there are exceptions arising from various causes. For example, some seasons ripen their fruits much later than others—take 1875. The fruit is late as a rule, and hence will not keep so easily or so well as in other years when it is placed away fully ripened. When the period of ripening arrives of any particular variety, it ought to be removed to another room, through which the smoke pipe of the furnace runs, where the emperature is considerably higher than that from which it has been taken, and there let

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it remain for a week or ten days. Remove it then into your warm dining or sitting-room, and after it has received the warmth of the upper rooms, and has been brought into a similar temperature as that in which you are sitting, the fruit is ready for eating.

It not unfrequently happens that some varieties are shy of ripening—take the Vicar (Le Curé) as an example, or the Easter Beurre. Both will serve by way of illustration. Such fruits require to be put into a bag, a paper bag, kept close, and opened only to see how far the process of ripening has progressed. The Vicar rejoices in being wrapt up in a piece of flannel, and in that way fitted for use; when well ripened there is no more luscious pear. Our monkish brethren have always been noted for their gardening habits, and for their knowledge of good fruits. The Vicar is well-named. During the snows, frosts, and storms of February and March, there are few fruits that can compare to a well-ripened Vicar of Winkfield.

In gathering pears, it not unfrequently happens that either with the finger or thumb, or by a sudden placing of the fruit in the basket, it gets bruised. It behoves every keeper and ripener of fruit sedulously to watch the injured, if any—for assuredly if not removed they will soon communicate the evil to others, and thus the husbandman lose his just reward. All spoiled fruit must be carefully removed—continual vigilance is the price of growing good fruit; continual vigilance is the price of preserving it when grown.

In giving a short description of the varieties of the pear with which we are acquainted, we purpose to divide them into market and amateur sorts. There are many varieties of pears which an amateur may profitably cultivate, which are not fit for general cultivation, inasmuch as market varieties are usually grown with a view to profit. Many early varieties esteemed good are, after all, of very inferior quality. We have for years cultivated the Madeleine, not for the excellence of the fruit, but simply because others have grown it, do grow it, and because as an early variety it has been deemed indispensable. It is a sort of comparatively little value either for amateur or for market cultivation. It is most liable to pear-blight—almost more so than any variety which we have cultivated.

The Doyenne d'Eté is the next earliest considered, though we are of opinion that it is earlier by some few days than the Madeleine. It is greatly superior to the former variety. In fact, if it be not the earliest and best yet grown, we scarcely know its equal. Its quality is first-rate, fine flavour, *fraiche* and melting. Among the early varieties it is as yet our favourite. It towers head and shoulders above all the rest of its season. We generally gather the fruit about the 25th or 27th of July; it is then fully ripe. We ripen it on the tree, never having tried the ripening of this pear in the house.

Next to it, perhaps, and claiming as early a season, is the Elliot's Early, a seedling raised in the neighbourhood of Amherstburgh, and cultivated and sent out by Mr. Dougall, Windsor. It is a pleasant, small pear, of curious shape and good quality. It is worthy of note that it seems to lengthen out its season according to its locality. At Berlin, cultivated by Mr. Roy, it is a fortnight later than at Hamilton. At Windsor it is fully ten days ahead of any locality where we know it to be grown. To our taste, after three or four years' trial, we are inclined to conclude that it is scarcely equal to the Doyeune d'Eté; that is, as an eating pear we prefer the former. One excellent quality it has, and one which ought not to be overlooked, that it will keep longer in a good condition than any early pear known to us. It does not rot at the core, and this is saying a great deal in favour of Elliot's Early. The tree is an upright, good, firm grower. We have always found it perfectly hardy, and as yet there has not been seen the least appearance of blight. This freedom from blight has led us sometimes to conclude that seedlings are to be sought, propagated and grown, and that hardy new varieties are the only panacea against the greatest drawback to pear culture—pear blight.

Another early pear with a poor reputation is the Ambrosie. It is a showy, worthless variety, and is to be avoided in any collection, however limited or large.

A summer pear well worthy of the attention of pear growers is a pear introduced to notice by Mr. Dougall, Windsor, called the Supreme de Quimper. It is a pear of large size for an early pear, and of great excellence in point of flavour. We have cultivated this variety for years, and every season adds to the high estimate in which we hold it. It is perhaps one of the best summer varieties, and we heartily commend it for general cultivation.

The Barbancinet is an early pear of good quality. In appearance it might be taken for the Louise Bonne de Jersey. Its season, however, is much earlier than the Louise. It is apt, if left too long on the tree, to drop. The flavour may be said to be very good, and the tree is perfectly hardy.

The tree is prolific, and blight has not yet attacked the one in my garden. As a market variety, we can commend it on account of its bearing qualities—bearing every year good crops, and during its season the highest flavoured variety.

A summer pear of singular excellence, and standing head-and-shoulders above the rest, is the Beurre Giffard. This pear is not at all so well known as its merits deserve it to be. It is a first-class pear—its quality is first-rate. The size and beauty of the pear commend it for general cultivation. The tree unfortunately is a straggling, poor grower; we can raise fruit, but we acknowledge we cannot raise the wood. We recommend this variety for universal cultivation. At Paris, Ont., they attain a wonderful size.

The Rousselet de Stutgardt perhaps is the next earliest and best of pears in its season. It is a small, prettily marked variety, both in its wood and fruit. It is hardy, and as yet free from blight. We have grown it since 1864. It is sugary in its sweetness and of a delicate rich flavour. It is only suitable for an amateur.

Next in order comes the Bartlett. It used to be known, and ought to be known, as Williams' Bon Chretien. We have no hesitation in saying that among the million it is the most popular pear going.

We are inclined to think that its excellence is not over-estimated. It is an admirable pear. As a market variety it cannot be beat. A grower known to us, when asked how many Bartletts he would plant in the hundred, replied, "A hundred." Being pressed to name another variety for market purposes, he still replied "I would plant all Bartletts." Bartlett is more sought after than any other pear. Among connoisseurs there are other varieties fast coming into favour, such as the Beurre Clairgeau and Beurre d'Anjou. It would be difficult for us to decide which is the best amongst these three varieties—perhaps for keeping qualities the two latter are even ahead of the Bartlett. In reference to the blight, it must be said that the tree is subject to blight—greatly subject, we would say. When the fruit is thinned it becomes very fine. The very writing about its quality makes one unconsciously recall its exquisite flavour and lusciousness; as a Scotchman would say, "Makes the mouth water." We question if the Niagara district can be beat for pears of this variety. We have never seen better samples grown than those exhibited by Messrs. Gage, Miller, Brown, and Currie.

We cultivate the White Doyenne, and for excellence, flavour and quality it is scarcely to be beat. It used to be known in New York market as the Virgalieu. It is now almost universally known as the White Doyenne, thanks to Mr. Barry, of Rochester, for his indomitable labours in lessening the numerous synonyms of pears as well as of other fruits.

The White Doyenne has one admirable quality—we refer to that of preserving. Its brilliant white colour gives it an advantage over most other pears, not even excepting the Bartlett. When cut up after the pattern of the flakes of an orange and skilfully arranged in the bottle, it has a most *distingué* appearance. It is a pear that may be grown with great profit, both to the amateur and market gardener. We have seen it crack and gnarl. This, however, is not frequent, though of late years it has spotted considerably in the Niagara district.

Next in order, perhaps, comes the Louise Bonne de Jersey. Take it all in all, we are inclined to judge this the most valuable pear grown. This because it flourishes over a larger area than that of any other known variety. It succeeds well in almost every district of our Province. In most localities it is A 1, and everybody speaks well of it. It is an abundant bearer, of good quality, a fair keeper as pears go, and wonderfully prolific. Its size is fair—above medium in fact—and it is a pear for universal cultivation. No collection, however small, should be without the Louise Bonne de Jersey. It ought to be added that we have found it very subject to blight. The fruit preserves well.

There is a pear grown by us, which comes in a week before the Louise, which is rapidly gaining in public estimation—we refer to the Beurre d'Amaulis, plain and *panaché*. The only drawback to this variety is that it is apt to overbear. When thinned it attains to a handsome size, and for flavour it has scarcely an equal in its season. The panachéd

variety of this pear is well worthy of wider cultivation. In appearance it sometimes assumes a peculiar rusty appearance, which, however, to our mind, only commends it as a superior variety. We commend the Beurre d'Amaulis for cultivation as a market variety.

A pear of great excellence is the Ott. We have sometimes felt mortified that it is so little known. It is said to be a seedling of the Seckel—it owes much to its parentage. It is a nice, highly flavoured, though smallish pear. For amateur cultivation it deservedly stands high.

The Seckel is said to be the standard of excellence. We are not inclined to question this all but universal decision, though there are many pears which come up to, if not exceed, its excellence. Were we inclined to be hypercritical we would say that its size would always militate against its taking the first place among pears. To our view, the Flemish Beauty, as a whole, is fairly ahead of the Seckel. When eaten, it ought not to be peeled, as much of the flavour is contained in the skin. Every collection ought to number in its list several trees of this variety. Downing and all other pear judges declare that this variety is super-excellent. We can only echo the "Amen, so be it!" It is indeed a delicious, hardy, productive pear, and not very subject to the blight.

We must not overlook the Belle Lucrative, or, as it is styled by pear growers, the Fondante d'Automne.

This variety is of singular excellence, and is a general favourite with the public at large. To our taste it is a shade on the over-sweet side. It is almost too luscious. A perfect fountain it is of juice, and that of the most honeyed kind. With some of our fruit-growing friends there is no variety can be or ought to be compared to this variety—we can only say, it sustains its character for excellence, and in awarding it its place of pre-eminence, we would only say, "*Chacun à son goût.*"

With us the Duchess de Berri d'Eté is not worth cultivating—elsewhere we have seen this fruit fair and good.

The Beurre Goubaldt is a good pear—it cannot be considered first-rate, but it is a fine pear. In some years they grow to a fair size—in fact greatly above medium. This season they were wonderfully large and handsome.

A pear ripening about the season of the Beurre Goubaldt is the Beurre St. Nicholas. It is a fleshy, showy pear, with a fine red cheek, and very taking in appearance—it will prove a good market variety, and we recommend it for general cultivation. Individuals visiting my trees in fruit have invariably coveted a scion of this variety. A friend came from quite a considerable distance to get one cutting of the Beurre St. Nicholas.

We must not overlook what we consider the queen of pears, we mean the Flemish Beauty. In point of size, form and beauty, we know of no pear to equal it. When well grown and of full size its flavour is exquisite and delicate. It preserves well, and when carefully canned will stand comparison with almost any other variety of pear. Its fruitfulness indicates it for general cultivation; its hardiness is proverbial, though it must be truthfully said that it is greatly subject to the blight. No collection should be without more or less of this variety—we question if any variety will bring more money than this sort. At no great distance behind the Flemish Beauty, if anything behind it, comes the Beurre Bosc. The beauty and form of this variety attracts the most casual onlooker. Its size, flavour, quality and shape render this pear a favourite with every grower. We have heard it said that the tree was tender. We have had no experience of its tenderness. It blights. As a market variety it perhaps has few equals. It enhances every collection on exhibition, and woe to the exhibitor that cannot embrace in his 20 or 10 varieties the peary shape, russety face of the Beurre Bosc. This season they were in fine feather, large, handsome and good. At the Western Fair in London there were some fine specimens on exhibition. As a market and amateur variety it has few or any equal to it.

Any notice of pears suitable for general cultivation ought not to omit mention of the *Sheldon.* It is a pear of rare excellence—a most prolific grower, and of admirable quality. The fruit is apt to be gritty, and we know few pear trees that are more ready to blight. We class the Sheldon, Oswego Beurre and Gray Doyenne in the same category—they are all good—the Oswego Beurre a very superior pear, and the Gray Doyenne, with the exception of the slowness of the growth of the tree, has few competitors in point of excellence. There is a host of good pears which we cultivate, ripening just about this season. One of these is worthy of a triple X—we refer to the Beurre Superfine. This is a pear that is growing in

favour the more it is known. The fruit is largely above medium, fair, free from grit, and of a superb sub-acid flavour. The tree is a little inclined to blight, though it is one of those trees which recovers after the knife has been freely used to excise the blighted limbs. It is perfectly ripe about the end of October, and is a fruit that is suitable both for the market gardener and the amateur grower.

The Kingsessing is a fine pear—coarse a little in the flesh, but with a charming aromatic flavour. It is valuable as never having shown the least sign of blighting. The fruit is large and handsome, though we are inclined to think a little shy in bearing.

We cultivate and esteem the Doyenne du Comice—the fruit is excellent, fine fleshed, free from all gritty matter, little core, fair and beautiful, with a most delicate whitish-yellow skin.

Among old esteemed varieties we grow the Gratioli de Jersey. It is a fine fruit when ripe, but we cannot commend it for general cultivation.

We hasten to notice briefly a few of the winter varieties cultivated by us.

First in esteem and value comes the Lawrence. We question if there be a better winter variety. The tree is a most prolific bearer, and apt to injure itself by overbearing. The fruit is something exquisite—sometimes it ripens late in the fall, and then it is excellent, but as dessert fruit for the Christmas and New Year's dinner table it cannot be beat. It keeps well till March if carefully stored. We have seen it good in early spring. We heartily commend the Lawrence for general cultivation. It will amply repay care and attention, and as a fruit growing in estimation it has no rival. With us the tree has shown no symptom of blight.

The Winter Nelis comes next—it has long been a favourite, a deserved favourite. Limbs have blighted with me, but I have never lost a tree of this variety. It grows sprawly, the spray is tender, and the fruit small; with these two drawbacks it is a good pear, of excellent melting quality, and apt at times to mature prematurely.

We dare not overlook mention of the Easter Beurre—it is a superb pear when fully and carefully ripened. It never belies its name; never ready to eat till its ecclesiastical season; it is a welcome addition to the table in April and March. The tree blights badly—all our trees this season of this variety have suffered more or less. Some friends of ours, known to the members of the Fruit Growers' Association, frequently declare that there is no winter variety that is worth keeping—none so good as a turnip. There is at least *one*, if not more, that must be excluded from this sweeping conclusion. The Vicar of Winkfield is the exception. There is scarcely a winter variety that can equal it when properly ripened. It requires care and skill in bringing it up to its full perfection. It often happens that this variety is too soon gathered from the tree. It should be allowed to hang on the tree till it has received a little frost, then barreled, and kept cool till early spring. It must then be carried into a warm room, ripened in a paper bag or close drawer. When it has a little blush on the sunny side, there is no pear that can compare to it in flavour and richness. We purpose to disabuse the mind of our friend who objects to speak kindly of any winter variety of pear, by having him taste a Vicar in all its glory. We ought, perhaps, to state that no pear will more reward judicious thinning out than this variety. It is a great bearer, and requires thinning.

We had almost forgotten to speak of the Beurre Millet—it is exquisite in flavour, small in size, but of singular beauty in the mauve colour of its cheek. To say that its flavour is superior to the Seckel, would perhaps startle our members. It is not inferior to any pear we know in the delicacy and fineness of flavour. In outward appearance it is mean-looking, and not unlikely to be despised, but it will amply repay every attention paid to its cultivation and care.

As a cooking pear we cultivate the Belle Angévine—it is prolific, large and of good flavour when cooked. We have grown them to upwards of two pounds weight. They surpass any other cooking variety in the size and quantity grown on any one tree. They are prolific, but this advantage does not seem to recommend them for general cultivation, as it is a variety not generally cultivated.

Other varieties have been tried, such as Duchess Precoce, but we do not esteem it better than the Duchess d'Angouleme, which is a pear of great size, popular, good flavour, and a good market variety. With all these recommendations it is shy to bear—abundant blossom appears, but often little fruit—in some years it loses its high flavour. During the present season it is poor in flavour, watery, and scarcely above mediocrity.

The Beurre Diel is extensively cultivated by us. It is a well-known variety—valuable for its fruit—but the tree is woefully subject to blight.

Passe Colmar is worthless. The fruit is good, but the tree invariably blights.

Neither the Stevens' Genesee nor the Dearborn's Seedling are worth their space.

We have also the Clairgeau and the Clapp's Favourite, with the Graslin, Catharine, Beurre d'Aremberg, Beurre Dillon, Beurre d'Anjou, Theodore Von Mons, Henry IV—all good varieties and worthy of general cultivation.

We conclude this paper by giving ten of the best varieties of pears—the best both for professionals and amateurs: Bartlett, Beurre Clairgeau, Beurre d'Anjou, Flemish Beauty, Lawrence, Vicar of Winkfield, Beurre Superfine, Seckel, Louise Bonne de Jersey, and Beurre Bosc.

Our tale of brick is finished—we have not been called on to make without straw; for on review we find that we have omitted quite a number of valuable varieties. If in anywise we have been able to forward horticultural interests, beget a desire to originate and grow good fruit, we shall feel amply compensated for the leisure hour or two in which, amid many distractions, we have again returned to describe our favourite culture.

SECOND PRIZE ESSAY ON THE PEAR.

MOTTO—"A well-grown and properly-ripened Pear is a delicious fruit."

BY JOHN MCAINSH.

The pear, from being a worthless fruit, has, by gradual improvements in the production and propagation of new varieties, reached a degree of excellence which places it in the front rank of our delicious dessert fruits. It is also highly esteemed for making preserves and canning.

The milder parts of our Dominion are well adapted to its cultivation, and in the more northerly and colder sections the hardier varieties can still be grown with some success. But it must be confessed, however, that it cannot be cultivated so far north as the apple and other hardy fruits. There is still room for our hybridists to extend the boundaries of pear growing, by producing a pear of good quality and sufficiently hardy to endure the severity of our coldest sections.

Soil.—The pear will grow on a variety of soils, but a strong clay is best adapted to it. It is of the highest importance that the subsoil as well as the surface should be dry, as a cold wet soil is very unfavourable to pear growing. There are few clay soils that will not be benefited by underdraining. Underdrains ought to be at least three feet deep, and laid in the centre of the space between the rows. The distance apart will depend on the nature of the soil. If it is a stiff, hard clay, a drain in every space between the rows will be beneficial; but if the soil is more porous, probably one in every second space will be sufficient. But on a tolerable dry clay soil pears can be grown, but not with such good results as where it is underdrained. If fruit growers paid more attention to underdraining, in many cases they would raise two bushels of finer fruit where they only raise one, and that often of inferior quality.

While a strong clay is best adapted for the pear, yet there are a few varieties which succeed on sandy or gravelly soils. I am not sufficiently experienced to speak confidently on this point, but the horticultural editor of the *Canada Farmer*, who is good authority, recommends the Bartlett, Belle Lucrative, Buffum and Flemish Beauty, confident that they will give abundant satisfaction on light soils.

Transplanting.—Transplanting young fruit trees from the nursery to the orchard is a very important operation. Great care should be taken, especially with the pear, which is scantily supplied with fibrous roots, to avoid haggling or mutilating the roots, as is too often done, to the injury of the tree. Young healthy trees will generally grow better than trees of extra large size. Where it can be done, I would recommend the planter to go himself to the nursery, select good healthy trees, and see that they are properly taken up. But if this cannot be done, deal only with a reliable nursery. Above all things avoid buying cheap

inferior trees, which are dear at any price. Previous to planting, the soil ought to be thoroughly pulverized, and enriched, if necessary, with well-rotted manure, to a depth of at least eighteen inches. Raw unfermented manure ought never to be applied to the roots of newly-planted trees. But if the subsoil be cold and wet, cultivating to this depth will be of little or no use. It ought to be previously made dry and warm by underdraining. In planting the tree, care must be taken to allow the roots to spread out in their natural position. The soil coming in immediate contact with them ought to be rich and finely pulverized, and pressed firmly around them. The tree when set out ought to stand at the same depth as it did in the nursery. Inexperienced cultivators frequently err in planting young trees too deep. Mulching the ground around the roots of newly planted trees with half-rotted straw or other material to a depth of eight or ten inches is very beneficial, especially in dry seasons. Twenty feet apart is a very good distance at which to plant standard pear trees, and ten feet for dwarfs.

Cultivation.—Where the best results in pear growing are desired, if the soil is dry and warm, and enriched to a sufficient depth, the best way is to grow no crop among the trees, but merely to keep a few inches of the surface loose and mellow by cultivating with the gang plough, cultivator or harrows. This secures the benefits of cultivation on the one hand, and avoids the necessity of injuring the roots on the other, by ploughing for the purpose of cropping. But by careful cultivation and manuring, a crop of roots or vegetables can be grown for a few years, until the trees attain a size sufficient to require the whole of the ground. But grain or grass is very injurious, and ought never to be raised in an orchard, especially among young trees.

Manuring.—The proper manner of manuring the pear is a very important point. The practice of manuring heavily once in three or four years ought to be avoided. A moderate application every year, so as to keep up a regular but moderate healthy growth, is the point to be aimed at. Care should be taken not to stimulate the trees into too luxuriant a growth, which renders them liable to disease. The best manures are well-rotted barn-yard manure, wood ashes, ground bones and lime. One point about these manures is worthy of remark. Barn-yard manure, wood ashes, and ground bones have a tendency to produce a luxuriant growth of wood; lime, on the contrary, has a tendency to throw the tree into a bearing state. The intelligent cultivator will aim to keep up a regular growth of young wood as well as fruit, knowing that if all the energies of the tree are directed to growing fruit, it will become stunted, and perhaps die.

Dwarfs.—The dwarf pear is not a particular species, as some imagine. Almost any variety of pear can be dwarfed by working it on the quince stock. Their chief merit is, that they come early into bearing. Forming only small trees, they are very suitable for garden culture, and the fruit of some varieties is of better quality on the quince than on the pear stock. But when standard trees come into bearing, they will in most instances be found more profitable. There are only a few varieties which can be recommended for dwarf culture. The Doyenne d'Eté, Beurre Giffard, Louise Bonne de Jersey, Duchess d'Angouleme, Beurre d'Anjou, Vicar of Winkfield, and Lawrence, will give a good selection. A very good plan for those setting out a pear orchard is to set out both dwarfs and standards. The dwarfs would come into bearing and give a supply of fruit while the standards were coming to a bearing state.

Training and Pruning.—Dwarfs throw out branches near the ground, and form low, small-sized trees. They can be trained to a variety of shapes, but the pyramid form, caused by cutting back the stem and checking the upper limbs until the lower ones become large and strong, is a neat and beautiful form, and affords the advantage of light and air to all parts, as the top branches do not overshadow the lower. Standards naturally grow taller than dwarfs, but it is not desirable to form heads higher than just to allow sufficient room to cultivate the ground beneath. The pyramid form will be found the best for standards, the same as for dwarfs.

In pruning, the practice of allowing the tree to form a dense thicket of branches, and then pruning severely, ought to be avoided by pruning moderately every year—just as much as may be requisite to admit a free circulation of air, light and heat through the branches. The wounds ought to be pared smooth, and covered with grafting wax, or, what is better, gum shellac dissolved in alcohol to the consistence of common paint. The close of winter, just before the sap begins to flow, is the best time to prune. Wounds made at this

season and covered with the aforementioned composition will heal far more rapidly than where they are left exposed. When trees are pruned in spring, while the sap is flowing, and left exposed without a covering of composition, the sap oozes out at the wound, which turns black and decays.

Shelter.—In years gone by, the almost unbroken forest with which the country was then covered formed a sufficient shelter for fruit trees. But now, as the country is being cleared up, the necessity of sheltering orchards from the fierce sweeping frosty winds of winter and early spring is becoming greater every year. The pear requires shelter more so than most of our cultivated fruits, as it is more delicate and easily affected by climatic changes. The best shelter is a belt of evergreens. The native species growing wild in the woods will answer a good purpose, but they are every way inferior to the popular Norway spruce, which is hardy, a good grower, making a very handsome tree, and as a windbreak is not surpassed by any. A screen, especially of the Norway spruce, would add greatly to the beauties of our rural homes. Another advantage which ought not to be overlooked is, it would prevent the high winds of autumn from blowing down the unripe fruit. But I can only briefly notice the question of shelter, which is of great importance both to the fruit grower and farmer.

Diseases.—The "blight" is the only serious disease affecting the pear tree. It acts in a mysterious manner, sometimes affecting a tree and leaving the one next to it untouched, although the two trees were as nearly alike as two trees could be. But the experience of pear growers collected from all parts of the country seem to point to the following conclusions:—1. That pear trees planted on a strong clay soil and not stimulated into too luxuriant a growth are less liable to this disease than those planted on light sandy soils. 2. That trees stimulated into too rank a growth, especially with unfermented manure, are more subject to it than those of only moderate growth. 3. That some varieties, the Glout Morceau for instance, are very liable to it. 4. That some varieties are more exempt from it than others, the Seckel being particularly noted in this respect. 5. That the filings of iron laid around the roots of the tree is thought by some to be a preventative. I have been growing pears for the last fifteen years. The soil of my orchard is a heavy clay, thoroughly underdrained. I have manured very sparingly. The trees have made a slow, moderate growth. I have been almost exempt from blight, having noticed only two or three cases partially affected out of over a hundred trees.

Keeping and Ripening the Fruit.—One of the most important points in the ripening of pears is to gather them at the proper time. Unlike most other fruits, they are much finer in flavour if picked from the tree and ripened in the house. The proper time to pick them is when the seeds have turned from a white to a brown colour, and the stem separates easily from the tree. This will be about a week before the summer varieties are ripe, and ten days or a fortnight in the case of the fall varieties. Winter varieties require to hang on the tree as long as there is no danger of frost injuring them; but care must be taken not to pick them too soon. It requires experience to tell precisely the right time.

On being picked they require to be placed in a close, dark, dry room to ripen. The temperature of the room ought to be about seventy degrees. But in the case of winter pears, which do not ripen immediately after being picked, they require to be kept in a room close, dry and dark, with an even temperature a few degrees above the freezing point. Some wrap each separate pear in paper, but a more convenient and inexpensive way is to pack them in barrels or boxes with dry oat chaff. When their time for ripening arrives, they can be placed in the ripening room at a higher temperature. A thermometer will be an almost indispensable thing to have to know the right temperature at which to keep the pears, either in the keeping or ripening room.

Varieties.—Out of the hundreds of varieties of pears in cultivation, there are only a few which are worthy of the attention of Canadian fruit growers. In describing the following varieties I will notice them in their order of ripening, and to the best of my knowledge give a true and faithful description of each. They have been planted and found worthy of cultivation in all parts of the country where the pear can be successfully grown:—

Doyenne d'Eté.—This is the best very early pear, a good grower, bearing early and abundantly, either as a standard or dwarf. It is inclined to overbear, in which case the fruit requires to be thinned out. The fruit is of small size, of a bright yellow colour, often beautifully shaded with bright red. It is of good quality, melting, juicy and sweet, and ripens about the 1st of August.

Beurre Giffard.—This is an excellent summer variety, ripening two or three weeks after the Doyenne d'Eté. The tree is a healthy but slender grower. The fruit is of medium size, greenish yellow, marbled with red. It is of very good quality, melting and pleasant. It succeeds well on the quince.

Bartlett.—This variety is more extensively cultivated throughout the pear-growing region of the United States than any other, and it succeeds well in the milder parts of our Dominion, but it is not sufficiently hardy for cultivation in the colder sections of the country. The tree is a thrifty grower, succeeding best as a standard, on which it bears early and abundantly. The fruit is of large size, yellow, with a slight blush on the sunny side. It is of good quality, ripening about the middle of September.

Flemish Beauty.—If we were forced to plant only one variety of pear, that one would be the Flemish Beauty. The tree is a good healthy grower, and very hardy, succeeding well where the famous Bartlett fails. It gives best satisfaction grown as a standard, on which it bears early and abundantly. The fruit is large and handsome, of a yellowish russet colour, with reddish-brown on the exposed side. It is of very good quality, sweet, juicy and rich, ripening about the 1st of October.

Seckel.—This pear, in its rich and honeyed flavour, is unsurpassed in point of quality by any other variety. The tree is a slow grower, but very healthy and hardy, succeeding best as a standard. The fruit is small, of a yellowish-brown colour. It is of the very best quality, ripening in October.

Louise Bonne de Jersey.—This variety is one of the very best for cultivating on the quince, on which it bears abundantly, and the fruit is of better quality than when grown on the pear stock. The fruit is large, of a yellowish-green colour, with a dark red cheek, of good quality, with a melting, rich, pleasant flavour, ripening last of September and beginning of October.

Beurre d'Anjou.—This variety deserves a place in every pear orchard. The tree is a vigorous and healthy grower, and productive either as a standard or dwarf. The fruit is of large size, of a greenish russet colour, of very good quality, ripening in November.

Vicar of Winkfield—This variety has been extensively cultivated on account of the tree being healthy, vigorous and an enormous bearer. The fruit is of a handsome appearance when well grown, but the quality is variable, generally poor and fit only for baking. Sometimes, however, it is good as an eating pear. Those who want a healthy, handsome tree, with a large quantity of fruit of beautiful appearance, can plant this variety, but those who want their fruit to be of uniform good quality must plant something else. As it is generally inclined to overbear, the fruit when small should be thinned out or else the tree will be loaded with a quantity of small fruit of very inferior quality. It ripens in December and January.

Lawrence.— This is one of the few early winter pears which can be recommended for cultivation. The tree is hardy, and bears early and abundantly. The fruit is of medium size, of a lemon-yellow colour when ripe. It is of excellent quality, with a rich, sugary flavour, ripening in December and January. This pear possesses a few points of excellence well worthy of notice. 1. It is one of the few winter pears which are really of good quality. 2. The tree is very healthy, being nearly exempt from blight. 3. It is a good keeper, ripening as early as a winter apple.

There are a few other varieties which are considered by some of our best pear growers every way worthy of cultivation, being productive and the fruit of good quality. I will just notice a few, which with those I have more particularly described comprise most of the sorts which can be recommended for general cultivation. They are Dearborn's Seedling, Rostizier, Tyson, Buffum, Belle Lucrative, Duchess d'Angouleme on quince, White Doyenne, Beurre Clairgeau, and Winter Nelis.

To grow pears successfully requires a considerable amount of horticultural knowledge as well as care and attention. Some varieties are either such poor bearers, or the fruit is of such inferior quality that they are unworthy of cultivation. And sometimes, where the best varieties are procured, they are planted on a soil altogether unsuited to the pear. This is particularly the case where the subsoil is cold and wet. The importance of having the subsoil of a pear orchard dry, either by natural or artificial drainage, cannot be too strongly urged. Those who wish a more thorough knowledge of the subject than the few hints I have thrown out in this essay can avail themselves of the experience of pear growers collected from all parts of the country. The most reliable source where this knowledge can be obtained is by studying

the discussions and reports of the Ontario Fruit Growers' Association, which is composed of the leading and most intelligent fruit growers of the Province. But while it requires horticultural knowledge, care and attention to grow pears successfully, yet such is the excellence of the fruit when well grown, and the highly remunerative prices at which it sells, pear growing when properly conducted bids fair to continue to be a profitable branch of industry. And where the cultivator only grows a few for his own use, he will find that a well-grown and properly ripened pear is indeed a delicious fruit.

ESSAY ON THE CULTIVATION OF THE PEAR.

"Tongues in trees."

By George Mill.

The pear tree is found wild in England, and in various parts of the Continent of Europe. Although it is not perhaps so useful as the apple, yet on account of its lusciousness and beauty it is generally the pet of the fruit-growing world. In the early stages of horticulture it is probable that new varieties would be introduced by insects carrying the pollen of one flower to the stigma of another. In modern times hybridizing is practised on scientific principles, and the results are new sorts of first class pears which are continually coming before the public; fruit that was once hard and acid is now melting and sugary, late varieties have become early, and *vice versa*.

The cultivation of the pear may be considered under the following heads: Grafting, Transplanting, Pruning, Culture and Storing the Fruit.

Grafting.—The greater number of fruit-growers get their trees from irresponsible tree-pedlars, a small number from nurserymen, and a few amateurs prefer to raise their own trees. After so much has been written on the folly of purchasing trees from parties who have neither a local habitation nor a name it is almost in vain to add anything further. If people are determined to let themselves be swindled there is no help for it, and we may rest assured that those smooth-spoken gentlemen who call themselves tree agents will walk about "seeking whom they may devour" as long as they find patrons. We would, however, advise all whom it may concern to buy their trees from respectable nurserymen or their accredited agents.

When parties choose to raise their own trees the first thing is to raise stocks. As the pear is not a prolific bearer of seeds it is necessary to economise them in order to raise as many stocks as possible. Fall sowing is generally more successful than sowing in spring. A piece of dry, mellow ground should be chosen, and the seed sown in lines about fourteen inches apart, and an inch to an inch and a half deep. When they are a year old they require to be lifted from the seed-bed and the tap root cut back about two inches in order to produce fibrous roots. They may then be planted out in rows two feet wide, and one foot between each plant. They require to be kept clean, and when they are about the size of the mid-finger they will be ready for grafting.

Some cut the scions as early as February, but they will do perfectly well to cut them in March, as they are not so apt to lose their vitality as when they are cut earlier. A good plan to preserve them until they are worked is to put them in sawdust and keep them in a cool place.

Grafting may be done any time between the first of April and the end of May. Cleft grafting is the usual mode, and is perhaps the surest, but it has the disadvantage of frequently producing an unsightly excrescence at the point where the graft and stock unite. Crown, or whip grafting, although not quite so sure, is preferable when neatness is required. When the weather is showery during the grafting season, clay is apt to get washed off before it is thoroughly dry, consequently wax will do better in wet weather. Grafting clay is made of equal parts of clay and cow-dung completely mixed; and good grafting wax may be made in the proportion of one pound of rosin, one pound of beeswax and half a pound of tallow. As grafts frequently miss, it is advantageous to graft as high up on the stock as will give opportunity to try again the following year, in case of failure. When seedling stocks are scarce they may be dug up and the roots divided and the scions grafted on the roots.

One of the designs of grafting is to multiply a given variety when cuttings are difficult to "strike." The propagation of a given variety, however, in not the only object in grafting. It is a well-known fact that the stock has considerable influence over the scion. Of course the essential character of the scion remains unchanged, although the quality is often considerably modified by the stock, consequently the choice of stocks is of considerable importance in grafting. A pear that is a poor grower of wood may be made more vigorous by grafting on a vigorous growing stock. On the contrary, when trees grow too much wood, or when early bearing and productiveness are required, it is usual to dwarf the trees by grafting on quince or thorn stocks, but such trees are generally short-lived.

Transplanting.—As the pear has a tendency to produce tap roots it is quite a benefit to shift them two or three times while in the nursery, to make them throw out fibrous roots. When the trees are about four feet high they may be planted out in the orchard. Of late years it has been common to plant out orchard trees in the fall, and where the wood is thoroughly ripened this will succeed tolerably well. It will be found, however, that early spring planting is the better way when the winters are severe and come on early, before the wood is properly ripened.

The pear is not particular in regard to soil, provided it is dry, but a clay loam, not too heavy, appears to suit it the best. It has been sufficiently demonstrated by vegetable physiologists that the food of trees is absorbed principally by the "spongelets" and not by the woody parts of the roots, consequently in transplanting trees care must be taken not to injure the roots but as little as possible. As it is seldom, however, that trees can be lifted without injuring the roots more or less, it will be found beneficial to prune back the head in proportion to the extent of the injury.

The pear being an upright grower, twenty feet apart each way will give them sufficient space in the orchard. After considerable experience I find that planting within two inches of the surface of the ground is quite successful. The ground requires to be ploughed first and well mellowed, then mark out a circle as wide or a little wider than the roots will extend horizontally, throw out the earth to the depth of two inches, then set the trees with their heads inclining a little to the south-west. After throwing a little loose earth on the roots it is a good plan to give them a copious watering if the weather is dry. The roots should then be covered up with loose earth to the depth of fourteen inches above the surface of the ground, and the trees firmly tied to a stout stake on the south-west side. If this precaution is neglected, the trees will be tossed about with the wind before the roots have sufficient hold of the ground to keep them steady.

In heaping up the earth in a small mound above the roots, the snow can scarcely ever lie round the bottom of the trunk, and this prevents mice from girdling them in winter.

Pruning.—The principal objects in pruning are to keep the head in proper shape, to induce the formation of blossom buds, and to improve the quality of the fruit. In the formation of the head the tree should be allowed to take its natural shape; consequently all that the pruner has to do is to thin out the branches where they are too crowded, or when they grow crosswise. Sometimes the head of the tree grows more to one side than the other: when that is the case, the side that is overgrown must be pruned back either by cutting out the superfluous branches, or shortening them until the head is evenly balanced.

As the pear is rather a late bearer, it will hasten the formation of blossom buds by several years to allow lateral shoots to come out from the ground at regular distances all the way up, or in other words to form dwarf standards. The usual practice of trimming up standard pear trees with naked stems five or six feet high before the heads are formed, retards the formation of blossom buds, because the energy of the trees is expended for several years in growing stems instead of growing branches which produce blossom or fruit buds. Let fruit growers who are doubtful about this matter take two or more pear trees of the same kind, plant them side by side; let half of them take the form of dwarf standards, and trim up the other half with bare stems six feet high, and watch the results.

When trees grow too luxuriantly, the formation of fruit buds will be promoted by taking away the earth from the extremities of the roots all round, and pruning them back six or eight inches. We have frequently seen this experiment tried, and it was always successful. The quality of the fruit will be improved by shortening or thinning out the fruit-bearing branches, and in removing all the useless spray from the tree during the early part of summer.

In reference to the proper time for pruning, it is somewhat difficult to decide whether

winter or summer pruning has the advantage. When trees are pruned in summer they are not so apt to bleed nor send out sprouts where a large branch has been cut off, as when they are pruned in winter. But it is to be borne in mind that in summer the sap is distributed equally throughout the tree; consequently cutting off branches in summer will not give any additional nourishment to the remaining branches until the following year. In the early part of winter the sap of trees is not in motion, hence this is the season of rest. It is evident, therefore, that when branches are cut off at this time all the nutriment which the roots will absorb through the winter and early part of spring will be distributed among the remaining branches. Taking everything into consideration, the early part of winter is perhaps the best time to prune.

Culture and Storing of Fruit.—After pear trees are planted out in the orchard, the ground may be occupied with carrots, potatoes, turnips and other green crops. In heavy clay soils, occasional summer fallowing is quite a benefit. After the trees begin to bear, the orchard may be seeded down with clover for a year or two, but no grain crops should ever be grown among fruit trees.

When the trees begin to bear, they require to be kept under good cultivation by a plentiful supply of stable manure; lime and a moderate supply of leached ashes answers well on heavy soils. A good top dressing of sawdust is an excellent manure for the pear, as it keeps the ground porous and moist.

The pear is liable to blight, and also to the attacks of the pear tree slug and other insects. Various remedies have been tried for insects with more or less success—such as burning sulphur under the trees, sprinkling them with a solution of hellebore, hand-picking, &c. When the trees are kept growing vigorously by good culture they will seldom suffer much from blight or insects. One very important preventive from the attacks of those pests is to keep the bark thoroughly clean. When a tree gets covered with moss and lichens, the functions of the bark are obstructed, and the tree becomes sickly, and every enemy seems to pounce upon it; besides, moss and lichens form a convenient harbour for all kinds of insects. Common lye run off as strong as will float a potato, then mixed with an equal quantity of water and applied to the branches and trunk with an ordinary mop, answers admirably. We use it every year during the early part of April, and it keeps the bark as clean and smooth as if it were varnished. Of course, when trees have not been kept clean from the time they were planted out, they will require to be carefully scraped before the lye will take any effect. When pear trees bear heavy crops they should always be thinned out; it makes the fruit grow larger and ripen better; besides, trees are more likely to bear every year when they are not allowed to overdo themselves.

The proper time to gather summer and fall pears is when they begin to drop off the trees, and winter pears should never be allowed to hang on the trees after the end of October.

In storing winter pears the best plan with which we are acquainted is to pack them up with finely powdered charcoal, perfectly dry. They may either be put in barrels or moderate-sized boxes. The pears should be carefully picked, and a layer of charcoal and a layer of pears put in alternately. Care must be taken to fill up all the interstices so as to exclude the air and keep the pears from touching one another. They may be kept either in a cool dry cellar or roothouse until they are sufficiently mellowed for use.

The following is a list of the principal kinds of pears with which the writer is acquainted:—

Summer Pears.

Avocat.—Medium size, yellow, excellent quality, good bearer; one of our best summer pears.

Windsor.—Rather above medium size, green or pale yellow when ripe, sweet, but not a first-class pear; tree a vigorous grower.

Fall Pears.

Bartlett.—Fruit large, pale green or russet; a fine juicy pear, bears well as a standard tree.

Beurre Bosc.—Yellow, rather large, very rich and perfumed; a moderate bearer.

Beurre Rouge.—Small brown, sometimes faint red, flesh melting, rich and juicy; good bearer, but not well adapted for a market pear on account of its small size.

Crassanne.—Moderately large, yellow, flesh soft and melting, a poor bearer ; not a profitable variety.

Flemish Beauty.—Large, pale yellow, sometimes a little reddish on one side ; flesh rich and excellent. When it gets anything like fair cultivation it is a first-class pear ; altogether it is the best fall pear with which I am acquainted.

Hacon's Incomparable.—Medium size, green, with a yellow tinge when ripe ; flesh melting, slightly acid ; moderate bearer ; tree rather a poor grower.

Jersey Gratioli.—Very large when under good cultivation ; colour brown or pale red ; flesh rich and melting ; tree a vigorous grower and bears well. Not sufficiently known.

Louise Bonne.—Large, green, flesh sweet; moderate bearer ; rather an inferior pear.

Maria Louise.—Medium size, yellow, flesh melting, moderately rich, good bearer. With rich cultivation a good second-class pear.

Winter Pears.

Beurre d'Aremberg.—Large when grown on a quince stock ; flesh melting; juicy ; subacid ; excellent bearer. Tree grows rapidly. A first-class pear.

Glout Morceau.—Large, greenish-yellow; flesh white, rich and sugary, without the least acidity. Resembles the Beurre d'Aremberg, but scarcely equal to that variety in quality except in very favourable localities. Tree grows rapidly. Seeds generally more perfect than in other fine varieties, consequently it is valuable for nurserymen and others who are raising seedlings for stocks.

Pear d'Auch.—Medium size ; flesh yellow, rich and high-flavoured ; good bearer. One of the best winter pears.

Passe Colmar.—Large ; pale yellow ; flesh juicy and sweet ; great bearer. Tree rather a slow grower ; quite a valuable variety.

Winter Nelis.—Medium size ; very rich and high-flavoured ; moderate bearer. Tree rather a poor grower. An excellent pear.

Winter Rousselet.—Medium size; russet; flesh melting and sweet. Productive. A good variety.

PRIZE ESSAY ON THE CHERRY.

"Fruit, the noblest gift to man, save woman."

By P. E. Bucke.

One may look in vain through the previous reports of the "Fruit Growers' Association" and find scarcely a word about cherries ; the grape, the apple, and the plum have been sent out from time to time, and discussions have been had on them at various meetings ; but the cherry, probably owing to the smallness of its fruit, has been overlooked. This should not be so ; it is believed that it only requires to be better known to be more appreciated.

Of all the fruit trees in common cultivation, the cherry gives us the first ripe fruit in the spring, for which reason—like the strawberry—it is the more acceptable, and consequently more readily sold. For culinary purposes it has positively no rivals ; at the period of its ripening, the late winter apples are becoming dozy, and the strawberry is always in its season eaten in its native state.

Growers of this fruit generally find the demand for it greater than the supply, and at remunerative rates. In its dried state it commands several hundred per cent. more per pound than any of the dried fruits of commerce. A recent invention having been put into operation in the States for taking out the stones, removes the only objection to it as an article of great commercial value.

The best varieties for general cultivation are probably the Kentish or Flemish, and the Morello, they being the most hardy, and can be grown on a larger area than any other kinds ; unfortunately, they are rather acid for table use. These and the May Duke may be planted wherever the apple will flourish with any degree of success, being not only hardy, but can be depended upon for sure and regular crops when all other varieties fail. It appears strange

that the acidity of the berry, both in the strawberry and the cherry, should be indicative of the variety which gives abundant crops. Housekeepers state that this tartness in flavour rather enhances its value for canning and cooking, as they retain their character better than a sweet fruit, which loses its individuality when combined with a mass of sugar.

Soil and Climate.—A moist but not retentive soil is that most suited to this fruit. Mulching should be employed to guard against drought; vicissitudes of moisture and dryness of the soil must be avoided if the greatest success in its culture is desired to be obtained—for this reason a gravelly sub-soil, so suitable to the grape, is not the best for the cherry. If the soil is not sufficiently rich when setting the trees, some well-rotted compost may be added, but no manure the component parts of which can be detected with the naked eye should be used. If the ground is poor, and such only can be had, it should be applied on the surface and not in contact with the roots. The cherry delights in a cool, even temperature, and for this reason should, as far as possible, be planted in shady situations. Should an evergreen wind-break be planted, at the south side of the orchard, along its northern border, would be a suitable place for the cherry plantation.

Planting.—The Bigarreau should be set thirty feet apart each way; the May Duke, Kentish and Morello, twenty feet, if planted as espaliers or against walls; Bigarreau, Elton, Knight's Early Black, Downton and Florence, twenty feet; May Duke and Morello, fifteen feet. In this country the north or east side of a wall only should be used, and the tree should be planted at least six inches from it. The cherry should be grafted or budded on the Mahaleb stock, the Kentish should be grown on its own roots.

Pruning and Training.—It is believed in this climate that all pruning should be done when the tree is in rapid growth, and in the cherry may be begun in June by pinching the luxuriant young shoots. Those starting from the top of the tree will be found to have made the greatest start, and therefore should be attended to first, and every week or ten days the tree should be looked over. The tree, if properly checked at the top, will throw out limbs close to the ground; these should be encouraged, as they will shield the trunk from sun-scald, and with a little care fruit may be had from the root to the apex. Shoots that cross each other should as far as possible be removed. When training the cherry as an espalier, the branches should not be taken horizontally from the stem, but allowed to ascend at an angle of forty-five degrees for a short distance, and then be brought down to a level; this method of training keeps them from gumming. When grown on walls the fan system is the most approved. The Morello, which, like the black currant, bears on the young wood, should be so pruned as to cut away the old parts and induce healthy young shoots to be thrown out; these should be allowed to grow to their full length.

The common red cherry is so much at home on the banks of the St. Clair River, below Sarnia, that the writer has seen it throw up suckers through a heavy sod; these will fruit at three years of age, and when they are from three and a half to four feet high.

Its Enemies.—The cultivator has a good deal to contend with in the enemies of the cherry—it is attacked by the curculio, the black knot and the birds. It is stated the black knot can be cured by cutting off the branch so soon as it is affected; or if this is impracticable, owing to its size, the diseased part may be shaved out, and the tree thus kept in perfect health. When the trees are trained as espaliers or on walls, nets may be employed to restrain the attacks of the feathered tribes, but for standards the services of a boy will be required to watch the fruit during the latter part of the time it is maturing. The curculio can only be combated in the ordinary way of jarring the trees, beginning with the formation of the fruit and keeping it up until the last insect is destroyed.

Marketing.—The cherry is usually marketed in one and two quart packages, similar to those used for the strawberry, and in flat Indian chip baskets of the capacity of from ten to twelve quarts; these are covered with gauze, which is stitched down to keep men from "picking and stealing," and also to keep the fruit in its place. This fruit carries better than the strawberry, and consequently can be marketed at greater distances; it is also easier and quicker gathered, and some of the leading men in Michigan, where it is extensively grown, have given up the strawberry and gone exclusively into its culture for an early market fruit, as it is not near so much trouble, and gives for that reason an equal amount of *profit* to the acre. The gathering should be performed in such a manner as not to damage the branches or break off the fruit spurs or buds. Too frequently the fruit is allowed to drop off itself, or is beaten down with long poles, thereby bruising it and injuring the tree; the fruit should be pulled by

the hand. This may be thought a troublesome method; but every one knows that bruised fruit will not keep, nor will it command a full price.

The wild cherry which grows in the forests of Western Canada is valuable for its wood, which is used by cabinet-makers for turning into bed-posts and table-legs; it is also cut into boards and used for all sorts of decorative work. The wood is hard and free from knots, and has a short, fine grain, which makes it very suitable for carving; and though of light colour when first worked, like the mahogany it darkens with age, or it may be stained of a deeper shade by steeping in lime-water, which brings out the grain very beautifully, and under this treatment is not liable to fade with the action of the sun.

In olden times, when wood was plenty and carpenters scarce, this tree was used for fence rails, as it split very freely when cut into twelve feet lengths. Its fruit is nearly jet black, and is as large as a black currant; it is frequently used for making cherry whiskey and brandy, and is much esteemed for its high flavour. The bark is employed for the cure of colds and hoarseness, and for throat and chest diseases, and is used in large quantities in Ayer's Cherry Pectoral. This tree is of quick growth, and would make a valuable shade tree if it were not for its fruit; but the boughs are brittle, and the boys make sad havoc amongst its branches when the berries are ripe.

The only varieties so far fruited here of which the writer has any knowledge are the May Duke and the Kentish, but so severe was the winter of 1874-5 that the fruit spurs were frozen so that they did not show the slightest sign of vegetation when the spring opened

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FIRST PRIZE ESSAY ON "WHERE AND HOW TO MARKET OUR FRUITS."

"PERSEVERANTIA."

BY LINUS WOOLVERTON, GRIMSBY.

Next in importanee to the fruit grower, after the good culture of his trees and plants, comes the proper management of his fruits when he has grown them. We propose then in this essay to take up in succession the chief sorts of fruit grown in Ontario, and make a few suggestions in reference to their most profitable disposal.

The great staple fruit of Ontario is the apple. Like wheat among the grains, it has become an almost indispensable article of household economy with both rich and poor. But Ontario cannot now, nor does she ever expect to be able to consume all the apples she grows. She may, however, anticipate becoming one of the chief sources of supply for the world, and already even is shipping hundreds of thousands of barrels to foreign ports. Everywhere she gets the credit of growing the finest of apples, which are much sought after by consumers.

But the grower who sells to some shipper, who again sells to some middleman, who again sells to retailers, evidently cannot secure to himself the best prices. The large orchardist should therefore become directly connected with some responsible dealer in some of the great apple marts, as Montreal, Quebec, New York, or perhaps even in Great Britain. To such a party the apples may either be shipped on commission, as fast as ready, or at price agreed upon. In the case of the small orchardist, however, it is no doubt advisable to sell at home at a fair price to some shipper.

Of still more importance than the market, especially to the large orchardist who ships his own fruit, is the manner of packing. Rules for this may easily be laid down by the essayist, but the details can only be learned by experience.

He must especially resolve to ship only the best fruit, even if the number of barrels is thereby considerably lessened.

He must use no deception, but make the show end of the barrel a fair sample of his goods.

He must pack closely, and remit his care in the case of *not even a single barrel.* Perhaps a whole cargo of apples might be characterized as inferior simply because the barrels first examined showed bad packing.

He must not handle his fruit when it is wet, or it will have lost its bright tempting look when exhibited on the market.

His winter fruit must be allowed to sweat before closing up, because this process in a close barrel tends to ripen it too rapidly.

He must use neat new packages, and address neatly with a brand; nor expose his vanity by disfiguring the barrels with his own name in great showy capitals, but rather use simply his initials, or some distinctive mark.

Next in importance, in certain though rather limited portions of Ontario, is the peach.

This fruit is so perishable that it can only be shipped by the fastest and consequently most expensive ways of carriage. Near markets are therefore desirable, which we in southern Ontario are fortunately favoured with, being on that line of latitude north of which the peach does not succeed.

The large peach grower must needs make full contracts beforehand for his crop, because in picking season his time is fully occupied with the care of his fruit.

Or he may ship on commission if he can find honest agents. These men can take a great deal of trouble and anxiety off the grower's mind, by doing the selling of the crop. The usual commission charged in Ontario is ten per cent. on wholesale and twenty-five per cent. on retail sales of this fruit.

The small grower will perhaps do best to sell his own fruit at the highest market price which its quality deserves.

Peaches are most economically packed in crates. For these packages a standard size has yet to be agreed upon by Canadian shippers.

For very choice peaches, however, baskets are preferable, setting them off to greater advantage.

In packing, it pays to select the fruit. At least this was the writer's experience last season (1874), when the crop was very heavy. Said our commission agent, "I find ordinary Crawfords, unselected, selling at $3 per crate, and extras selling the same day at $4 50, and in some cases I notice a still greater difference."

In using crates, too much care cannot be taken to pack the fruit closely, so that it cannot rattle about in handling. It should be carried to the depot in a spring waggon, and carefully put on board the cars, for the slightest bruise upon so delicate a fruit will not only disfigure it, but also be the source of premature decay.

The address should be put upon the end of the crates, so as to be easily seen when they are piled. A brand for the purpose can easily be had of a tinsmith, which both facilitates the marking and presents a very neat appearance.

The pear is worthy of a more extended cultivation in Canada than has yet been given it Notwithstanding the blight, it is still very profitable, since, if shipped in good condition, it brings very high prices.

Ordinarily, the best market for pears seems to be among the retailers of our own towns in Ontario, especially for early summer or fall pears. The Bartlett, for example, unless packed almost before it has completed its growth and attained its full beauty, is in danger of becoming over-ripe before reaching distant markets. A few barrels of this variety, picked when their full size and colour was obtained, and before the mellowing process had begun, were shipped to Montreal during the summer of 1874. Advice had been received that pears were selling at $14 per barrel in that market. But these were a week on the way; they reached their destination in an over-ripe condition, and sold for $2 per barrel! At the same time a home market would have paid $7 or $8 per barrel, and have been without risk.

Choice pears and very choice apples might well be marketed in half barrels. But for ordinary fruit the common sized barrel is much to be preferred.

Year by year it is found to be more and more an object to classify our fruit for market. No doubt the time will come when poor fruit cannot be sold at any price, and when only choice fruit will bring remunerative prices. With pears, as much as with any fruit, it pays to select, and to ship the best in neat new packages, with quality marked upon them. These should bring at least one-third more than the ordinary sized fruit.

Pears should be packed closely in the packages by hand, and the head pressed in, but not with quite so much power as in the case of the apple.

The consignee should be notified of the day of shipment, and of the number of barrels shipped, that he may know what are coming, and about when to expect them.

In connection with the pear, and as requiring much the same manner of handling, we mention the quince. This fruit seems as yet but little known among the consumers of On-

tario, and hence of course the demand is small. But the increase of supply will be accompanied by an increase of demand. Where it is shipped one year, we notice a larger number is wanted the following year.

For home markets it is best put up in small packages, but for distant ones, in barrels or half barrels. The usual price is about $3 per bushel.

The cherry is so often a failure that it is somewhat a disputed point as to whether it would be profitable to grow it largely for market or not. It is best packed in baskets covered with brown paper, or more showily, with coloured gauze. It must, of course, be carefully picked with stems on, and, like all other fruits, only when dry.

Extra heart and Biggareau cherries thus packed should bring the shipper from 75cts. to $1 per peck basket; while the retailer will probably get from $1 to $1 50 for the same. But it must never be forgotten that everything depends upon the condition in which they reach the market. Only the best cherries should be put up, and those only in the most careful manner.

Among the small fruits, strawberries are the most generally cultivated in Ontario. Properly managed they are profitable, but a poor strawberry patch is like a poor field of wheat—time and money thrown away.

Strawberries are, of all our fruits, the most easily damaged in handling; hence the necessity of the most careful picking. The berry itself should scarcely be touched by the pickers, but the stem only, which should be severed by the thumb and finger. The berries should be put directly from the vines into the baskets in which they are to be marketed. Perhaps the most convenient package for this berry is the ordinary crate of fifty-four baskets, or for small lots the crate of thirty baskets.

Owing to the perishable nature of this fruit, very distant markets are of course inaccessible. But it is such an universal favourite, that it is amazing what quantities are consumed by our own towns and villages.

The canning factories also make use of large quantities, and by preserving them for use throughout the year, much increase the quantity consumed.

In much the same manner are the raspberries and blackberries marketed. The blackberry, coming as it does at the same time with the peach crop, must be distributed among different markets, as no one will absorb a very large quantity unless when the peach crop is a failure.

The black-cap, however, is slowly but surely growing in favour. It has few contemporary fruits with which to compete, and is each year becoming better appreciated in our home markets. These berries are best shipped in the strawberry crate. The basket, however, must be made tighter for the raspberry than is necessary for the strawberry. The baskets should be well filled, else the jarring in handling will give them the appearance of short measure.

Like strawberries, they can be shipped by express to the nearest towns, where there are always some fruiterers ready to handle them. Of course this manner of shipping applies to large growers. Small market gardeners will always do best to retail their own small fruits directly from the waggon to consumers.

The currant also is rising in favour as a market crop. The large varieties are much sought after by our townspeople, and are very productive. They bring nearly double the price that the small common variety does. They may be sold to confectioners for jellies, or to fruit dealers for retailing, as with other small fruits.

They should be picked bunch by bunch from the bush, without disturbing the cluster or bruising the fruit. They may be shipped in strawberry crates, or they may be put up like cherries in peck and half bushel baskets.

The gooseberry is usually marketed in a green state. The gloved hand easily removes them from the bushes into a basket. The leaves and other litter may be removed by rolling the fruit thus picked down an inclined plane. The handle-basket makes the most convenient package in which to ship them.

The cultivation of the grape is attaining large dimensions in Western Ontario, both for wine and as a market fruit. It is probably more profitable for the former than for the latter purpose. Still Concords and Delawares, finely grown, can be very profitably sold as dessert fruits.

The bunches should be severed from the vine by the scissors, taking care that the grape

itself is untouched by the hand, in order that the bloom may remain undisturbed. They should then be carefully laid in the boxes. These boxes may be had of pasteboard nicely coloured and labelled; or they may be made of thin wood. They commonly hold from three to five pounds of fruit. The box may be first lined with tissue paper; then the grapes laid carefully in, packing from the bottom, so that when filled the box may present an even, attractive appearance. When filled a little more than full, the bottom must be gently pressed to its place; then the box may be turned and marked upon the top with the kind of grape and the number of pounds.

Many shippers, however, prefer the basket to any other package for grapes also, and there is no doubt but that it is very convenient.

As grapes are not so perishable as many of the fruits we have mentioned, their sale need not be confined to near markets, but distant cities may in some cases bring more remunerative prices, especially if they be cities that have no nearer source of supply.

Care, of course, must always be taken, in the shipping of fruits, to secure good and honest men as consignees, as there are many rogues ready to entrap the unwary. But having once secured such an one as is reliable, let no caprice lead to sudden and uncalled for changes. Some disappointments must be expected. The market will not always be up to one's anticipations, and will bring the bitter as well as the sweet.

In such a paper as this, it is, of course, useless to attempt any more than a few general hints. No man will ever learn the art of growing or marketing fruits merely by reading. The details can only be learned by experience, and that too often dearly purchased.

If these stray hints shall point out to any beginner in fruit culture the path which shall bring success, after the addition of much experience, it will be fully as much as the writer can reasonably expect.

"PERSEVERANTIA."

SECOND PRIZE ESSAY ON "WHERE AND HOW TO MARKET OUR FRUITS."

MOTTO—"Qui docet, discit."

BY REV. ROBERT BURNET, HAMILTON.

Fruit culture is gradually becoming an important interest in our Province. Indeed it may well rank among our foremost industries; and although it cannot compare to the agricultural development of our country in a pecuniary consideration, still the annual income derived from fruits can be estimated by hundred thousands of dollars. The demand of late years for Canadian fruits has become general, and in the British market our Canadian brands stand A 1. It is understood as a matter of fact that Canadian apples bring as high—if not higher—prices in Britain than any variety from the far-famed Genesee Valley.

It is a matter for congratulation, therefore, that our Fruit Growers' Association have entered the lists to urge forward the production of good fruits by offering prizes for the best essay on the *where* and *how* to market our fruits. It is the question of questions to the fruit grower, when he has carefully raised his fruit, Where am I to get the best market and the highest price? After all, "hope of reward" induces to earnest perseverance and hard labour. But for the pecuniary returns, fruit growing, with its manifold uncertainties, would be at an utter discount. Men labour with the hope that their labours will be rewarded. It is a remarkable fact that with the development of any industry, a market is sure to follow. Coal oil was no sooner discovered and utilized than it came into general use. So with fruits: let them be raised of good quality, presented in good condition, and a discerning public will not be long in estimating aright the production.

In taking into account the best market for our fruits, one important element must not be overlooked, and that is the distance from market, or, in other words, the expense of carriage, for these terms are synonymous. A home market, therefore, will on this account be preferred to a foreign. A ready market is a home market to all intents and purposes.

Fruit growers in Ontario have a very considerable choice of markets. The nearest, of course, is the United States. Thousands of dollars' worth of fruit are every year sold to the New York buyers, who, it is affirmed, are ready to put their own brand upon them after the

purchase. No one acquainted with the production of fruit, and the indomitable perseverance of fruit growers on the other side, would consider the States one of the best markets for our fruits. Indeed, we find ourselves checkmated by New York State on the one side, and by Western growers in Illinois and Michigan on the other. It is a fact that much fruit is sold to New York buyers all along the Niagara Peninsula. From the Grimsby District, both above and below the mountain, much fruit is sold. The same may be said of Essex and Kent. Detroit receives a large addition to the fruit market from Canadian growers, and also from the Islands in Lake Erie. Buffalo has a complement from Welland and Haldimand, and so of many contiguous cities and towns along the frontier.

At present there is much talk of opening up commercial communications with the West Indies in various kinds of Canadian products, such as Canadian lumber, and Canadian-cured meats and the like. Here is a wide opening for the fruit grower. Canadian fruits are greatly desired by these Island populations, and prices range high for the coveted productions of our northern climes. Shipment to the West Indies is as easy and more available than to any British port in Great Britain. Should the Fruit Growers' Association be in anywise the means of directing notice to such an excellent market, and of inducing capitalists to engage in such a trade, and thus open up a new source of profit and income to our countrymen, they will have conferred no mean advantage to the trade and commerce of our Dominion. It would not only be a lesson fraught with benefit to ourselves, but would prove equally beneficial to our neighbours and friends in and around Annapolis and the fruit-bearing districts of Nova Scotia. The West Indies would prove an admirable market for the finer kinds of our winter fruits. Our Roxburgh Russets, Rhode Island Greenings, Golden Russets and Russets of Western New York, would prove eminently satisfactory to the palate of our West India countrymen.

From the South we may turn our attention to the West. For some seasons past a deal of fruit has been shipped from Collingwood, Owen Sound and Sarnia, for Sault St. Marie, Lake Superior ports, and Prince Arthur's Landing. This must always prove an unfailing market to Ontario fruit growers, and yearly an increasing one. The population of this western region is rapidly growing, and the country is being developed by a wonderful material prosperity. The climate, too, will always afford a fair chance for our people to supply all the fruit-wants of the dwellers on the shores of our upper lakes. A large quantity of plums and apples are annually shipped from Owen Sound to the Sault. This will increase, and every season will witness a larger shipment. The only drawback to the Lake Superior District as one of the best fruit markets, is the distance. It is something wonderful to think that a country requiring four or five days' steaming should be almost altogether dependent on us for the luxury of fruit. When this district is fully opened up, a rich harvest will be reaped by Canadian fruit culturists.

We may turn our attention to the Ottawa District. This will prove ere long one of the best markets for our Western fruits. In some respects it is like carrying coals to Newcastle to take some varieties of apples to the capital. We cannot compete with the people of Ottawa in growing the Duchess d'Oldenburg, the Alexander, and a few other varieties. Little, comparatively little, has been done to diffuse a taste for good fruit in the Ottawa Valley. Shippers as a rule have confined their market to Ottawa itself. There are, however, several large towns and villages which would afford as good a market as the metropolis itself. The field is uncultivated, and much has yet to be done to develop it. Facilities are daily being opened up to prosecute this trade. There is a choice of railroads—water communication is ready to Brockville and Prescott, and direct railway communication will soon be with Pembroke. The whole country is being opened up ; the inhabitants have to be taught to appreciate good fruit, and the first to embrace the opportunity will reap the fruits.

Montreal, to a limited extent, is also a good market for our Western fruit producers. New York State, however, enters into competition with us for this market. Vast quantities of fruit are annually sent from Lockport, Rochester, and the counties bordering on Lake Ontario, to Montreal—peaches, apples, and grapes alike find their way there. This, too, we have learned, in paying quantities. Surely what the producers of Western New York can do, we can do likewise. If the men of Lockport can successfully compete with us, we, with our facilities in the means of communication, may be expected in the long run to outstrip them in the race. Montreal, we say again, is a good market, but not the best.

We come now to speak of the best market for disposing of certain kinds of our Ontario

fruits—we mean our winter varieties of apples. The best market in the world for such fruits is undoubtedly Great Britain and the Continent of Europe. First and foremost is the British market. It is true that it is liable to be glutted, but so is almost every other mart. The vast quantities of fruit that are sent home from the States is really the cause of the flooding of the market. Indeed, such difficulties more or less must always accompany dealings in a perishable production like fruit. We question if glutting of the market either at home or abroad can ever be prevented. In Bristol, Liverpool, and Glasgow, the highest prices going are for Canadian apples. Some brands are so well known, such as the Beaver Brand from Niagara, that they bring much more than those from the Genesee Valley. We might here digress and say that Canada produces the highest priced and therefore the best fruit in the world. Nor would we be far wrong. The highest price is only given for the best fruit. The best fruit is the quickest grown fruit. In Canada our short, clear, warm summers produce the best apples in the world. Cereals are unlike fruits. Wheat requires a long time to mature, but not so with fruits. Fall wheat is greatly preferable to spring sown, but apples, pears, plums, and almost every known variety of fruit are the better of being rapidly grown. We have little doubt that the reason of our apples having such a rapid sale in Great Britain is that they are not so tough and firm as European-grown fruit. The difference between Canadian and Nova Scotia apples is also very marked. The season in Nova Scotia is longer than ours, hence their fruit is tougher ; it wants the quality which the French well designate by *fraicheness*. For these and other obvious reasons, we shall always be able to compete in the English market with their home-grown fruits. In younger days we well remember that American apples were considered cheap at a penny each. They were much more in some seasons when the home crop was scarce. London we presume to be the best fruit market in the world. It can always be disposed of at what it is worth—if good, it will command the best price, and so of inferior brands. There is always a market.

France and Germany rank as second to Britain; Germany before France. Hamburg is perhaps next to London. Good apples have a ready sale in all the Hanse towns. Copenhagen, Christiania and Stockholm would also absorb a quantity of our Canadian fruits. The north of Europe would prove a prolific field for the cultivating of a fruit market to our fruit growers. In many ways benefits would arise. The excellence of our fruit districts would be directly brought under the notice of the inhabitants, who have only indirectly heard of Canada as a country likely to prove suitable to the intending emigrant.

And now as to the *manner*, the *how* to market our fruits:

The first grand essential is to grade our fruits. In every orchard there ought, at least, to be three grades of fruit.

1st. The best hand-picked fruit to be had.

2nd. The worm-eaten, and inferior samples.

3rd. Knarled, worthless, ill-shapen and under-sized samples.

The first alone should be shipped to a foreign market. Fruit growers cannot be over-scrupulous in keeping good faith with foreign dealers. Several Canadian producers have earned for themselves a name and a fame abroad by the manner they market their fruits. They are all hand-picked, to begin with. No worm-eaten fruit is mixed with their samples. The top and bottom of the barrels have the same fruit. No case occurs in which, like packers of figs, a few fine ones appear on the top of the package. Similarity in the samples of fruit marks the dealings of the honest fruit producer in all his fruit productions—the barrel is really what it purports to be. We are greatly inclined to condemn the mixing of different varieties of apples, and the same remark is true of pears. Economically, we are justified in this remark. No one can get two varieties of apples with the same eating or baking qualities. Let the trial be made of cooking only Rhode Island Greenings in a dish, and then let the attempt be made to mix Russets, Spitzenbergs and Newton Pippins, and the difference will stand out in marked contrast. In marketing fruit, and especially apples, let them be homogeneous: all Spys—all Rhode Island Greenings—all Roxburgh Russets—all Baldwins—all Pomme Grise. This leads us to note how great an advantage a farmer has who has only planted his orchard with a few of the leading varieties. To market well, a man must plant judiciously. We are inclined to think that a carefully selected variety is more profitable than twenty varieties of even the most excellent sorts.

Another remark on the manner of marketing our fruits might be hazarded with regard to the packages employed.

We have sometimes noticed that the barrel tastes the fruit, and gives it its own peculiar flavour. One year we invested in new oak apple barrels; the wood was new, the barrels were recently made, and the fruit was recently packed. The consequence was that the fruit was almost useless—it smelt of the barrel, and the tannin of the oak staves was perceptible in the fruit. We have sometimes thought that a good, unflavoured white wood might be found in our Canadian forests, which would answer every purpose for a fruit package. Elm might be tried, of which there is a vast quantity in all our swamps. Some scentless wood is what is wanted.

In marketing fruit for the home market, nice cases is an essential requisite. The slovenly way of marketing apples in bags, which is so common in every city, town and village of our land, ought to be frowned down. Fruit growers ought to see to it that the productions of Pomona, so tender, easily bruised, and apt to be destroyed with heathenish handling, should be brought for sale in boxes or barrels. Were a discerning public alive to their best interests, they would give a considerable premium for fruit brought to market in boxes. This would work a wonderful revolution in the *how* of marketing fruits. We must educate our people to their true interests.

Smaller fruits, such as plums, peaches, grapes, &c., &c., ought to be exhibited for sale in *taking* packages—ornamented in a manner to attract the buyer, and after a fashion to display the fruit to greater advantage. A friend has hit on the right plan. He markets his plums and peaches in neatly adorned paper boxes, which show off to the greatest advantage his favourite cultivation. It is striking what a demand there is for fruit marketed in this manner. It pays thirty-fold for the outlay, and creates a taste for good, well-handled fruit, which in every way redounds to the benefit of the producer.

It may not be apart from our subject to suggest that when the dimensions of our fruit-growing interests assume such an importance as would justify the appointment, that certain trusted fruit growers should be sent to the large fruit marts, and have the fruit of their fellow producers consigned to themselves. The saving of commission charges would amply repay the outlay. The market would be controlled by the growers, and the profits would find their way into the pockets of legitimate parties. We are strongly of opinion that the time is not far distant when our fruit interests will be so largely developed that it will pay Canadian growers to send their own agents to Europe to successfully carry out the marketing of their fruits.

For all such amendments in the present mode of conducting fruit marketing, we say, Organize, organize, organize. Fruit growers must no longer stand aloof from each other, as if the best interests of one class of producers would prove detrimental to the interests of another class.

It is something like a general taste for reading; let this taste prevail, and there cannot be too many books produced. So of fruit marketing; what will benefit one will benefit all, and every individual success will only tend to the aggrandizement of the whole.

We have thus attempted to describe the *where* and the *how* of marketing fruits.

When the Fruit Growers' Association of Ontario, through such means as the production of essays, shall have fully awakened our people to the benefits accruing from marketing in the best markets, and the best methods of doing it, then and then only will the mission of the Association be accomplished. The marketing is so allied to the production of fruits, that the one is correlative of the other. When it becomes fully known *where* fruit can be marketed, and when information is given *how* it is to be done, the difficulties now experienced by fruit growers throughout the Western Province will be obviated. When the full benefit of raising fruit is felt, and the rewards of the fruit producer flow into his own pocket, then and then only will the efforts of our Association be fully appreciated, and the far-reaching aims of the Directors be fairly understood.

ESSAY ON "WHERE AND HOW TO MARKET OUR FRUITS."

MOTTO—"Excelsior."

BY GEORGE PEACOCK, MOUNT SALEM.

1st—*Where.* In large towns, We must become acquainted with the amount of population, and the location of all large towns within reasonable distance, as well as the quantity and

quality of every kind of fruit which will be likely to be in demand during the season, with the probable supply from all sources so far as can be ascertained.

The requisite information in regard to supply and demand can be obtained readily and cheaply by a gentle touch of the "magic wire." We would, therefore, recommend some central position, as St. Catharines or Hamilton, for the location of an "expert" in the "magic art," whose duty would be, first, to receive despatches from all fruit growers in Ontario who may have any fruit to sell, containing correct statements of all kinds of fruits, of the quantity and quality, mode of packing, &c., which will be for sale during the season. The information must be supplied as early in the season as the condition of the various fruits will warrant the grower to make a fair estimate of the amount of each crop, all of which should be classified and recorded for reference.

2nd. He will be required to telegraph to all likely places, till he is able to find buyers for all the fruits that he has in his reference book for the season; he will thus have all the requisite information at his finger's end, and with a single touch, as it were, of the "magic wire," he can direct the whole crop of a season to the exact location where it will be most remunerative to the grower and most beneficial to the consumer; he can advise two, four or six sellers to one place, as many or more he can direct to another town, &c., till all the fruits in the Province are disposed of.

With the proper information from seller and buyer, and a little nice management on the "magic wire," a great amount of carriage, risk of selling and overstocking the markets, will be avoided; consequently prices will always range high. Should there be a sudden or unexpected rush to a market, say New York, the orders can be reversed by a touch of the finger, which may send them flying to Chicago or elsewhere, as it is always known where such a consignment is wanted at paying prices.

The sellers will vary with the season as the crops of fruit turn out abundant or scanty; therefore they must always apply to the operator, with fee of course, and have their wishes recorded in season.

With the large towns it is different. The seasons have no effect on them; their wants are always the same; but the operator must ascertain by direct communication which town is most scantily supplied, and is likely to give the highest prices.

Before exporting to Great Britain, the following towns should be consulted with, in reference to supply and probable prices, &c.:—

Town.	Population.
London	3,455,160
Glasgow	534,564
Liverpool	516,063
Manchester, 356,626 Salford, 135,720	492,346
Birmingham	366,325
Dublin	314,666
Leeds	285,118
Sheffield	267,881
Edinburgh	211,626
Bristol	196,186
Bradford	168,305
Newcastle-upon-Tyne	137,665
Hull	133,932
Portsmouth	122,632
Brighton	111,089
Leicester	109,830
Sunderland	106,342

The towns of over 100,000 inhabitants in the United States are:—

Town.	Population.	State.
Buffalo	117,800	New York.
Baltimore	267,300	Maryland.

Town.	Population.	State.
Chicago	350,000	Illinois.
Cincinnati	216,300	Ohio.
Louisville	100,700	Kentucky.
Newark	105,000	New Jersey.
New Orleans	191,400	Louisiana.
New York and Brooklyn	1,458,391	New York.
Philadelphia	674,000	Pennsylvania.
St. Louis	311,000	Missouri.
Washington	109,000	Dist. of Columbia.

Here are markets for good fruits the year round.

The following towns in our own Province need large supplies :—

Town.	Population.	County.
Barrie	5,000	Simcoe.
Belleville	10,000	Hastings.
Brantford	9,000	Brant.
Brockville	6,300	Leeds.
Chatham	6,000	Kent.
Cobourg	5,000	Northumberland.
Guelph	6,900	Wellington.
Hamilton	27,000	Wentworth.
Ingersoll	5,000	Oxford.
Kingston	15,000	Frontenac.
London	20,000	Middlesex.
Merrickville	12,000	Grenville.
Ottawa	30,000	Carleton.
Peterborough	7,500	Peterborough.
Port Hope	5,000	Durham.
St. Catharines	10,000	Lincoln.
Stratford	5,000	Perth.
Toronto	60,000	York.
Windsor	5,000	Essex.
Woodstock	5,000	Oxford.

We should not forget—

Montreal	107,000	Montreal.
Quebec	51,000	Quebec.
St. John	40,000	New Brunswick.
Halifax	30,000	Nova Scotia.

2nd. How to sell fruit.

We would say by thinning, picking, assorting and packing.

1st. Many trees bear so abundantly that the fruit is not of sufficient size or flavour to sell readily. All such trees should be well thinned before the fruit is half grown. But it is said to take so much time and expense that thinning is seldom thoroughly performed. On a fair examination of the operation these objections will vanish ; for, suppose it costs fifty cents to pick the fruit from a tree, let twenty-five cents be spent in thinning, for which half the fruit or more can be taken from the tree, and in less than half the time that it would take to pick the whole of the fruit, for quick handling is all that is needed for culls to be given to swine. The remaining fruit, which is left to ripen, can be picked for the other twenty-five cents.

The raspberry should be thinned by shortening the tips of the canes, on the principle that, by diminishing the inferior fruit, we increase the saleable crop. The same observation will apply to the blackberry, the gooseberry and the currant.

Strawberries, perhaps, can be improved more than any other fruit by judicious thinning and careful culture. We have seen a piece of ground producing strawberries larger, and

more bushels, than potatoes grown on the same plot some years previously. The land was poor, of course, yielding unsaleable potatoes, but by the application of natural fertilizers, careful cultivation and seasonable thinning, picking, assorting and packing, such results were obtained—selling at sight.

2nd. Picking should be done with great care—the larger fruits, such as apples, pears and peaches, into convenient baskets lined with soft cloth, to prevent bruising; leaving on the bloom or waxy or downy covering, that the fruits may appear in all their beauty. They should be picked so as to leave the entire stem on the fruit, which can be pushed sideways or upwards, when the natural separation between the spur and the stalk will be easily accomplished, without any adhering buds.

For cherries and plums there should be two pickers; one for the good fruit, the other to take care of all the wormy and bruised and rotten and otherwise injured fruit, for swine. Thus culling and assorting while picking will make the fruit more saleable.

The smaller fruits, as strawberries, &c., should have two or three pickers—the first to secure the finest and largest fruits without any being over-ripe, or not ripe enough; nothing but the very best in size, and appearance should occupy his packages; the second to gather all the good medium-sized fruits; and the third should pick all the rotten and inferior fruits to be given to swine. By this method there will be no tainted fruit left to spoil the remaining portion of the crop, which is left to ripen; and both sizes in separate packages will be more satisfactory than when mixed together, for sale, in the same parcel. The large berries will often pay for all the extra labour and expense, when they are taken to a market where size and appearance are appreciated.

3rd. Assorting.—Small fruits and stone fruits should be assorted while picking, in order to avoid unnecessary handling; once in the fingers and into the package, for sale, is enough for berries and plums; the more of the natural bloom is left on the fruits the better they will appear in market. A great amount of observation and experience convince us that good, clean, even-sized fruits command more ready sales than when various sizes are muddled together in the same package.

Apples and pears should be thoroughly assorted; all the specimens which are of extra large size, of very beautiful appearance, without a bruise, having a whole stalk and no more, and in every way the nearest to perfection in form, &c., should be separated from the rest of the fruits, and named "Excelsior Fruits." Of the remaining fruits, two qualities may be made, to be styled "Very good" and "Best;" always remembering there must be a considerable quantity of culls, some of which may be nice fruit, to be culled again for cheap market purposes, and for drying, &c. The residue will serve a good purpose for live stock of all kinds.

Many sales of fruits are prevented or inferior prices are obtained by having mixed with them a few bruised or poor-looking specimens, that should have been left at home. Assort closely and sell readily.

4th. Packing small fruits should be done up in pints, quarts, or two or three quarts, &c., according to the liability of the various sorts to be damaged more or less by carriage. The condition of the roads and the distance to market may sometimes be taken into account, and a saving in packages be obtained. No small fruit packages should be used twice, as any fruit stains or finger marks on neat packages would spoil the sale of the fruit. The second use of any such packages is equal to soliciting inferior prices.

The "Excelsior" apples, and pears, and peaches, we would pack in cubical boxes, to contain one bushel; to be got up in neat style, lined with tinted paper and having cubic pasteboard cells, each cell to contain but one specimen of fruit. Cut the pasteboard into strips as wide as the fruit, and as long as the box inside.

Cut notches half across the strips, as wide as the pasteboard is thick, and so far apart as to correspond with the size of the fruit to be packed.

Put the notched pasteboard strips together at right angles, so that notches upwards and downwards fit into each other; and we have a system of squares, or rather cubic cells, sufficient to cover the bottom of the cubical box; fill the cells by putting a fruit into each, over which place a square sheet of pasteboard, which will serve as a new bottom for another system of cells, again to be filled each with a fruit, and covered with pasteboard for another bottom, on which to place another system of cells, &c., until the cubical box is filled; and it will be seen that, though the box be full, no two fruits touch each other. Lining the box as well as the cells with appropriately tinted paper will greatly improve the appearance of the fruit and

thereby make it more saleable. "Excelsior" apples, in "Excelsior" packages, have been sent from East Elgin to New York market, where they were sold, at retail, for *twenty-five* cents each.

Recommendations of the Directors of the Fruit Growers' Association in reference to the Amendments to the Agricultural and Arts Act.

1st. That the present system of the election of Directors be allowed to continue as it has been in the past, Directors to be elected from any district where desirable men can be found.

2nd. That the number of Directors be increased from nine to twelve, and that they have the privilege of electing their officers at their first meeting, in the same manner as the Board of Agriculture.

3rd. That the officers be a President, Vice-President, Secretary and Treasurer, and that the Board shall have the power to elect at their discretion both Secretary and Treasurer, from any of the members of the Association, and the Treasurer shall annually give such bonds as are satisfactory to the Directors, the amount not to be less than one thousand dollars.

4th. That the financial year of this Association begin with the 1st of January, and that all members who have paid their annual fee during any year shall be held to be members. and have all the privileges of membership until the 1st of January following.

CENTENNIAL EXHIBITION AT PHILADELPHIA IN 1876

Recommendations of the Directors of the Fruit Growers' Association of Ontario to the Advisory Board of Ontario.

The Committee recommend that *all* our Canadian fruits be represented at Philadelphia in their season, beginning with our strawberries, and ending with a grand display of fall and winter fruits in September.

To accomplish this object, it will be necessary to appoint a suitable Committee from among the members of the Fruit Growers' Association, whose business it shall be to collect from the various districts in the Province the fruits in their season, and forward them to Philadelphia, such Committee to be nominated by the Directors of the Fruit Growers' Association at their autumn meeting in Belleville, and to be under their control.

In order to insure the arrival of the fruit in good condition, your Committee think it would add greatly to the success of the undertaking if arrangements could be made by which it could be shipped in ice cars similar to those in which fruit is now conveyed from California to our Eastern markets.

Your Committee contemplate the obtaining of all the perishable fruits in season, beginning with the southern and ending with the northern sections of our Province, so as to lengthen the period as much as possible during which each variety can be exhibited. and, after a careful estimate of the probable cost of collecting, packing, the supply of suitable boxes for all the various fruits—summer, autumn and winter—your Committee are of opinion that an appropriation of three thousand dollars will be required to satisfactorily carry out and accomplish the object desired in the manner indicated.

In order that the exhibition of our Canadian fruits may be creditably carried out, your Committee deem it absolutely essential that the agent employed to receive and exhibit the fruits in Philadelphia be a person possessed of sufficient knowledge and skill in fruits to command the confidence of our Association, and we think this end could best be attained by such party being recommended by the Directors of the Association, and placed under their control.

Since the amount of space to be occupied by our summer fruits will be liable to constant fluctuation, your Committee would suggest that a sufficient number of Canadian wild flowers and others, and small fruits in jars properly preserved, suitable for decorative purposes, be

forwarded in pots, so that all blanks on our tables which may occur from time to time may be suitably filled up and decorated.

In order that our country may reap the greatest possible benefit from this exhibition of our fruits, illustrating as it would in the most practical manner the character of our climate and soil, your Committee would suggest that full printed statements should be supplied from time to time, giving the names of the fruits and detailing the districts in which they are grown, and that this information be printed in English, French and German, and be supplied for gratuitous distribution at Philadelphia.

It was further recommended that the Board send two members of the Board of the Fruit Growers' Association alternately to Philadelphia for three weeks, during fifteen weeks of the Exhibition, that their travelling expenses be paid by our own Treasurer, and that the Dominion Government be requested to pay their hotel and incidental expenses while there. That the members sent give a statement or report of what they see and hear of matters which may prove of benefit to the Fruit Growers' Association of the Dominion.

CANADIAN HYBRID RASPBERRIES,

Raised by Wm. Saunders, London, and Charles Arnold, Paris.

In pursuance of the determination of the Directors of the Association to encourage the production of new varieties of fruits suitable to our climate, we commence in this Report to illustrate some of the valuable products of our hybridists' skill.

Mr. Arnold, after many years of patient and persevering labour, has hybridized a number of his own seedlings with very successful results. If their present characteristics prove to be permanent upon a more general distribution in hitherto untried localities, they will be very valuable acquisitions.

Mr. Saunders has succeeded in hybridizing the Philadelphia with the Black-cap, and has raised several crosses, which have the combined qualities of both. These plates illustrate the varieties that will be sent out in the spring of 1877.

PREMIUMS FOR ESSAYS FOR 1876.

The Directors offer the following premiums :—

First.—Twenty-Five Dollars for the best essay on hybridization, and its Canadian results.

Second.—Fifteen Dollars for the second-best essay on the same subject.

Third.—Twenty-Five Dollars for the best essay on the best methods of utilizing our surplus autumn fruits.

Fourth.—Fifteen Dollars for the second-best essay on the same subject.

Fifth.—Twenty-Five Dollars for the best essay on shelter for fruit-growing.

Sixth.—Fifteen Dollars for the second-best essay on the same subject.

Seventh.—Twenty-Five Dollars for the best essay on fruit exhibitions, and how to secure from them the best results.

Eighth.—Fifteen Dollars for the second-best essay on the same subject.

Notice.—Essayists must send their papers to the Secretary on or before the first day of November, 1876, each inscribed with a motto, accompanied by a sealed note, endorsed with the motto inscribed on the essay, and containing within the name of the author.

The Judges may give such awards as they may deem the essays to merit, withholding the prizes altogether, when judged necessary.

DISTRIBUTION OF FRUIT TREES.

The Directors are making arrangements to distribute to all who may then be members of the Association, the following trees and plants in the several years mentioned below :—

1876.

GLASS' SEEDLING PLUM,

A large purple variety, ripening in October, especially valuable for cooking and marketing.

1877.

CANADIAN HYBRID RASPBERRIES,

Raised by Wm. Saunders and Charles Arnold. Coloured lithographs accompany this Report.

1878.

"THE BURNET" GRAPE,

Raised by P. C. Dempsey, Albury.

1879.

CANADIAN HYBRID APPLE,

Raised by Charles Arnold, Paris.

MEETINGS FOR 1876.

Summer meeting at London.
Fall meeting at Simcoe.
Winter meeting at Hamilton.

PRIZE LIST.

PERMANENT PRIZES.

First.—AN HONORARY MEDAL to the originator of any new fruit, which, having been thoroughly tested for a series of years, is found to be worthy of being placed among the fruits of its class for cultivation in Ontario.

Second.—FIFTY DOLLARS for the best Canadian Seedling Late Winter Apple, to be at least equal to the old popular varieties now in cultivation.

Third.—THIRTY DOLLARS for the best Canadian Seedling Harvest Apple, of like merit.

Fourth.—TWENTY DOLLARS for the best Canadian Seedling Autumn Apple, of same excellence.

ANNUAL PRIZES.

PRIZES FOR 1876.

First.—Awards may be made by the Committee on Seedling Fruits of sums *not exceeding Ten Dollars* for any seedling fruit that may be submitted to them during the year, which they may deem worthy, although they may not yet be prepared to advise the Directors to bestow either of the permanent prizes. Such award shall not in any measure disqualify the exhibitor from eventually receiving, for the same fruit, one of the permanent prizes.

Second.—FIVE DOLLARS for the best Winter Seedling Apple, fruit to be grown in 1876, and exhibited at the succeeding Winter Meeting of the Association.

Third.—FIVE DOLLARS for the best Autumn Seedling Apple, to be shown at the next Autumn Meeting of the Association.

Fourth.—Five Dollars for the best Summer Seedling Apple, to be sent, when in condition for examination, to the President, Rev. R. Burnet, Hamilton, all charges prepaid, and to be by him submitted to the Committee on Seedling Fruits.

Fifth.—Five Dollars for the best Seedling Winter Pear, fruit grown in 1876, and exhibited at the succeeding Winter Meeting of the Association.

Sixth.—Five Dollars for the best Seedling Autumn Pear, to be shown at the Provincial Exhibition.

Seventh.—Five Dollars for the best Seedling Summer Pear, to be sent, when in condition to be examined, to the President, Rev. R. Burnet, Hamilton, carriage prepaid, for submission to the Committee on Seedling Fruits.

Eighth.—Five Dollars for the best Seedling Plum, to be sent to the President when in season.

Ninth.—Five Dollars for the best Seedling Peach, to be sent to the President when in season.

Tenth.—Five Dollars for the best Seedling Grape, of any colour, to be sent to the President when ripe.

Eleventh.—Five Dollars for the best Seedling Strawberry, to be sent, if possible, to the Summer Meeting; if not possible, then to the President.

Twelfth.—Five Dollars for the best Seedling Raspberry, to be sent, if possible, to the Summer Meeting; but if that be impracticable, then to the President when in season.

Thirteenth.—Five Dollars for the best Seedling Gooseberry, that is not subject to mildew, whether of European or American parentage, or a cross between them; to be sent to the Summer Meeting, if possible, otherwise to the President.

Fourteenth.—Five Dollars for the best Seedling Blackberry, sufficiently hardy to endure the climate of Ontario. Fruit to be sent to the President when ripe.

Should two or more Seedlings of equal merit be shown, the prize shall be awarded to each. The Committee shall in all cases withhold the prize altogether, if they do not deem the fruit worthy.

A Seedling to which one of these annual prizes has been awarded cannot compete a second time in this class, but may compete in the class of Permanent Prizes.

A Seedling Apple which has received one of the money prizes in the class of Permanent Prizes, cannot again receive a money reward, but may be offered in competition for the Honorary Medal.

Certificates of Merit.

Seedling fruits which have received any of the foregoing money prizes may be offered in competition for certificates of merit.

The Committee on Seedling Fruits will report to the Directors those fruits which they think to be worthy of a Certificate of Merit. The Directors will then make full inquiry and examination concerning the character of the fruit, including size, appearance and quality, the habit, vigour, health, hardihood and productiveness of the tree or plant, and its general adaptation to the climate of Ontario; and bestow such Certificate, if any, as they may think it worthy to receive.

A fruit which has received a Certificate of Merit may be offered in competition for the Honorary Medal.

The Honorary Medal may be given any number of times to the same person for different fruits, but only once for any one fruit.

Conditions of Competition.

Seedling fruits offered in competition for these prizes must be shown in quantities of not less than *half a dozen specimens* of each sort, if they be Apples, Pears, Plums or Peaches; if Grapes, not less than *three bunches;* if Berries, not less than *one pint.* Each sort or variety must be accompanied by a statement, signed by the person sending the fruit, setting forth the origin of the tree or plant, if known; if the origin be unknown, then so much of the history of the tree or plant yielding the fruit sent, as may be ascertained—its vigour, hardihood and productiveness, the character of the soil in which it is growing, and what, in the estimation of the sender, are the peculiar excellencies of the fruit. This rule *must be ob-*

served in all cases, whether the fruit be shown at the meetings of the Association or sent to the President for the examination of the Committee.

CONDITIONS OF MEMBERSHIP.

The annual fee is ONE DOLLAR, payable on the first day of January in each year, and may be sent to the Secretary-Treasurer, D. W. Beadle, Esq., St. Catharines.

Any person remitting the fees of old or new members, with their names and post-office address, may retain ten per cent. of the amount for his trouble. This arrangement is in lieu of the extra allowance in trees formerly given for each club of five members.

THE FRUIT-GROWERS' ASSOCIATION OF ONTARIO

seeks to collect, arrange and disseminate information on the subject of Fruit Culture.

These objects are secured in the following manner :—

By holding meetings every year in different localities, of which all members receive notice by circular; by reporting and preserving the discussions; by procuring and publishing valuable essays by skilled fruit-growers; by appointing committees to make personal examination of different sections of the Province, and report upon the peculiar characteristics of the soil, climate, and special conditions of fruit culture therein; by illustrating the Annual Report with coloured lithographs, drawn from nature, of the new fruits raised by our Canadian hybridists; by disseminating among the members trees or plants of some new fruit that promises to be valuable throughout the Province, only exacting that the members will make a report for a few years to the Secretary as to the manner these succeed with them; by rewarding essayists, and, as far as practicable, the efforts of our hybridists.

In calling the attention of your neighbours to the advantages and benefits derived from becoming a member of this Association, you will confer a favour on your friends, and receive ten per cent. of the amount you may collect as a recognition of your services.

ROBERT BURNET,
President.

INTERNATIONAL FRUIT EXHIBITIONS.

In 1876, at Philadelphia, will be held the Grand International Centennial Exhibition.

The success that Ontario achieved at Boston in 1873 surely indicates that we need not hesitate to exhibit a collection of Canadian fruits on this occasion. Such an opportunity of making the world acquainted with the capabilities of our country in fruit-growing ought not to be neglected, as no better advertisement could be given for the encouragement of emigration.

Not only ought our rulers to be forward in providing the means to defray the expenses incidental to such exhibitions, but also our fruit-growers should, by judicious thinning out and cultivation, make the best preparation.

WILD GOOSE PLUM

Mr. Arnold, of Paris, has been at much pains to procure and fruit this variety, and exhibited specimens of this, both fresh and preserved, at our last autumn meeting. It proves to be an inferior variety of wild plum, not worth raising. We have, growing in our forests, many varieties which are much more valuable in every respect. Members of the Fruit Growers' Association will no longer need to purchase them, at from one to two dollars per tree, for the sake of ascertaining the truthfulness of the above statement.

Utah Hybrid Cherry.

We have taken some pains to ascertain what are the merits of this supposed cherry. From the best information which we have obtained, we would hereby caution our members against being too anxious to pay large prices for a tree that we are fully persuaded will prove as worthless as the Wild Goose Plum.

"That New Hardy Peach."

It is marvellous how nature, ever bountiful, is equal to the demands made upon her by man's credulity. A hardy peach seemed to be needed for Canada. No sooner is, then, the want felt than it is provided for. Ohio, not heretofore celebrated for the production of hardy varieties of fruit trees, has with unexampled promptitude come to the rescue, acting on the principle, we suppose, that a fool is born into the world every minute for one wise man to practise upon. No wonder that such *a hardy and valuable peach* should be held at the moderate price of two or three dollars per tree; but more marvellous still, the generosity of our Ohio cousins, who are willing to accept the third year's crop in lieu of half the price. What wise man can resist the temptation to make such a profitable investment? Surely the crop will amply repay the confiding purchaser, who fails to see that the seller is getting four-fold value, even though the third year's crop never appears. Canadian nurserymen, stingy souls, demand twenty-five cents in gold for "that New Hardy Peach."

Utah Currant!

Listen, ye fruit growers of Canada. The big tree of California must hide its diminished head, now that *Utah* has entered the lists with her new Currant production. Who wouldn't want them? Three or four times the size of anything heretofore seen in Canada. Part with your hard-earned dollars; there is no fear that your lips will be tantalized in your effort to taste the big Utah Currant; but, with Pope, you will perhaps have but one occasion to say—"fades like the baseless fabric of a vision, and leaves not a wreck behind."

Singular Freak.

Mr. Jno. McLean, High Street, Owen Sound, writes to the Secretary as follows:—

"I myself, when pulling plums, discovered two blue plums growing on a tree bearing a greenish-yellow plum; on the limb was first one yellow plum then two blue, same size and form, and free from all disease, followed by four yellow. Probably the tree is Prince's Gage; these I sent to Mr. Burnet, which I hope he received. I unfortunately pulled off the four yellow plums, above the blue, before making the discovery."

It is matter of regret that these plums never came to hand

ESPALIERS.

For the Report of the Fruit Growers' Association, by P. E. Bucke, Ottawa.

At first sight, it appears strange that the beautiful and economic way of growing fruit on the Espalier system has been little practised in Canada; it is presumed the reason of this is the small value attached to land, and the time taken up in tying and staking them. Certainly during the growing season, time is a valuable commodity, but the value and beauty of Espaliers would repay the artistic gardener fully as well for his trouble as growing the graceful and healthful grape on trellises. It is true the apple will grow on an upright stem which the grape will not without support, but there are places and circumstances under which it is desirable to grow the apple where either the tall or dwarf tree would be out of place. From an ornamental point of view nothing looks better than walks lined with espaliers, and nothing is neater than a nicely turned angle in a walk, the stock set on the corner of the bed, and the branches trained neatly along the end and side.

In small city gardens this mode of culture has great advantage, because little or no room is used for the growth of the tree, and as fine crops, and often better fruit, is secured in this way than when they are trained with bushy heads; and the partial shade given by them to most vegetables is a positive advantage, as they do not, like standards, exclude the light from above.

The fruit from the Espalier is seldom shaken down by high winds, the stake to which it is fastened making it firm and unyielding; consequently the boughs do not sway and thrash about. No matter how the tree is loaded, no supports are required,, and there is no danger of the branches breaking or splitting at the crotch from the load of fruit, which is always well coloured from the fact of the sun and air having free access to the whole tree, no part being shaded by its branches and leaves.

In Britain, Espaliers are chiefly nailed to walls, though they are not unfrequently grown as above described, to divide off walks, or as a shelter in other parts of the grounds; sometimes they are employed as a screen to divide the flower portion from the kitchen garden, and in a variety of ways become both ornamental and useful.

Perhaps it is hardly necessary to state that dwarf trees are those chiefly used for Espaliers. Dwarf apples on Paradise stocks should be planted from ten to fifteen feet apart, Pears on Quince stocks twenty feet apart, and Cherries on the Mahaleb stock the same distance. In selecting trees, obtain those with three shoots, or, if that is not possible, set those you have obtained where they ought to grow, and the second year after planting cut them down to eight or nine inches of the ground. From this stump allow three shoots to start; the lowest of these should be tied down the following autumn or spring to within ten inches of the ground, the leader or upright shoot should be cut off say twelve inches from the other two, and three more shoots should be allowed to develop themselves—an upright and two branches; the following spring the branches should be tied down as those previously grown, and the leader headed off to fifteen inches above them; this practice should be followed every year until the desired height is attained. Side shoots springing up from the horizontal arms should be kept pinched in, and the laterals encouraged to lengthen themselves.

The mode of staking Espaliers is as follows: In the spring of the year, after the first branches have grown, a stout stake must be set to tie the upright shoot to, and two others, twelve inches on each side of the first, to which are attached the horizontal arms. Care should be taken not to injure these, or split them at their juncture with the main stem. If they do not come down very readily at first, they should be brought as low as convenient, and left for a few days, when they will be easily brought into position. The stakes used should be two-inch cedar poles, the smallest end sharpened and driven into the ground; the stakes should be sawn off level, and stand about five feet high; a light rail is attached to the top for neatness, and to keep them steady and straight in a row. In two or three years, as the tree extends, the centre stem will be found strong enough to support itself, and the side arms will strengthen with age, so that very few stakes will be required to support the tree when it has come to its full size and height—probably six or eight will be quite sufficient. It is better to have a light rod fastened across the stakes to tie the shoots to during the growing season; this keeps them in a straight line, and gives a tidy appearance to the tree. Stakes will be required every eighteen inches or two feet apart, as the side arms extend, until they become stout and stiffened by age.

I have found the tenderest trees may be grown here on the French cordon system of one arm each way, having now on my grounds a peach tree three years old. Cordon apples make nice borders for beds, and should be grown from six to eight inches from the ground.

PEDIGREE OF THE DIADEM RASPBERRY.

In the spring of 1860 I began hybridizing the raspberry by applying pollen of the old Franconia upon the pistil of the old White-cap, or what used to be called the White Black-cap, a variety that rooted from the tips of the new canes; and out of a large number of seedlings produced from this cross, only two showed the least symptoms of having been affected by the pollen of the Franconia. These two were *red* and very inferior-looking

raspberries. They threw up suckers, and would not root from the tips, and were very interesting to me as varieties capable, in my opinion, of further improvement by again crossing, as the long-established character of the White-cap had been broken. These two varieties were again crossed, with a view this time of producing fall-bearing varieties. The White Four Seasons was imported from France for that purpose. From this second cross several very much improved varieties were produced—some red, some white, but all throwing up suckers, and refusing to root from the tips, and some of them excellent fall bearers and of good flavour. The Red and Yellow Canada and Orange King were thus produced and sent out by me in the year 1868. But fall-bearing raspberries did not prove so valuable in this section of country as was anticipated, and the Orange King being very hardy, of excellent flavour, and productive, I again crossed it by using pollen of Hornet, Imperial and Belle de Fontenay, and the raspberry illustrated at the title-page of this Report is a seedling selected as one of the best of a large number produced by this cross. In my opinion it is the largest, most hardy, productive, and high-flavoured yellow raspberry ever grown on this continent. It will be observed by the above that this is the third generation from the White-cap, improved every time it has been crossed. Query: How much more could this raspberry be improved by further crossing?

CHARLES ARNOLD.

IRRIGATION.

It is not at all unfrequent in Canada that during the month of June, when the luscious strawberry is beginning to swell and ripen, and the raspberry is putting forth its petals, a season of hot dry weather sets in, which lasts for weeks, no rain falling to refresh the earth; the oppressive rays of the sun descend with scorching violence, drying up both fruit and plants, the parched soil being warm enough, if not to cook an egg, at least to hatch one. To tide over this season of drought and heat the gardener is recommended to apply a heavy *mulch* to the soil; and though this may be found of partial advantage to the long canes of the raspberry tribe, it is found in many instances totally inadequate to the wants of the strawberry; and it is believed the true method of securing a plentiful crop of fine large berries is to have a supply of water that can be turned on at the will of the cultivator. This would not only increase the size and beauty of the fruit, but prolong its season from two to three weeks, as the last berry, which now dries and shrivels up, would be as plump and fresh as that first gathered.

It appears strange, with our present advanced state of civilization, and the fact admitted that agriculture is the basis of all our wealth in Canada, we should be so dreadfully behind-hand in the limited means of our water supply to those people whom we speak of as barbarians. The ancient Egyptians irrigated plentifully and successfully. True, no rain falls for months at a time in the valley of the Nile. The Israelites carefully terraced and irrigated the hill-sides along a vast area of their sunny lands, and on these the vine and olive were cultivated with great success. The ancient Romans also used irrigation as a means of fertilizing the soil. The Saracens and Moors who overran Spain carried agriculture to an art which has probably not yet been surpassed either on this continent or Europe; have left behind them monuments of their industry and skill in their noble works for the irrigation of the soil, which put to shame the ignorance and indolence or misdirected energy of the rural population of the present day.

The Spaniards found, at the time of their conquest of Peru in the sixteenth century, immense works for the purpose of irrigation. One of these canals was between four and five hundred miles long; in its course it passed round mountains, over rivers and marshes, and was carried through rocks and hills. The valley of Nasca, now an arid desert, was then watered by a stream four or five feet in depth by three in width, formed of blocks of uncemented masonry, and yet these works were constructed by people who knew not the use of iron—the ruins of basins and tunnels still extant.

The humid atmosphere of Britain makes the use of water artificially applied almost unnecessary, yet even there we sometimes hear of drought, and consequently methods of applying water have not unfrequently been tried, sometimes by letting water through pipes punctured with holes, and at other times by applying moisture by sprinkling or flooding.

It is perhaps unfortunate for science that the United Kingdom is so situated that irrigation is not absolutely necessary, as had that country a dry climate like Canada, with its extensive water resources, the problem would long ere this have been solved as to the best mode of raising and applying it to the land both cheaply and efficiently.

In California, where no rain falls for months at a time, and where a shower would be ruinous to the farmer, the finest crops of fruit and grain are grown in the world. The work of irrigation is easily arranged, because the water, as in Peru, is derived from lofty mountains, where pepetual snow lies on the high summits; this is being continually melted in the summer sun, and flows down in rivulets, which makes the water easily collected and led in channels to be conducted as the cultivator sees fit. The absence of rain in this district is caused by the dry hot desert lying to the eastward, from which no moisture is distilled to rise into the upper atmosphere, and consequently no clouds are formed; whereas, from the west, the clouds made from the evaporation from the Pacific Ocean are condensed as they pass over the cold snows of the mountain top. In this rainless territory no barns are used during summer for the storing of grain or hay; the grain is thrashed in the fields, and left there in heaps for in bags, and the hay is drawn in waggon loads and dumped down in heaps promiscuously near a pressing machine, where it lies for weeks or months until the farmer gets ready to stow it away.

In Japan, where the rainfall is *three times as great* as that of the United States or Canada, a vast and universal system of irrigation has been constructed by immense labour, consisting of large reservoirs, and a net-work of canals, which supply water to every part of the large island of Niphon. Canada should take a lesson from the Japs. With a sufficient quantity of water running to the sea each year to flood the whole country, with all sorts of crops and even cattle dying of thirst, we allow the waters to run past our doors unheeded, and the agricultural products on which our country so much depends are thereby reduced to less than one-third of what they should be.

It is believed the strawberry gardens of Oakville, and in other places where they are cultivated in large quantities, and where water is abundant and convenient, would be benefited to the extent of at least three times the crop by a thorough system of irrigation. In the Province of Quebec almost every farm of any extent is provided with a windmill. A cheap erection of this sort, to which pumps could be attached, would be the readiest mode of raising water; and where the land slopes to the lake, a sluice could be constructed of two-inch planks at no very great expense. One board eight inches high, and two boards of the same width for the bottom, would throw back to a high level sufficient water to irrigate a hundred acres. This box should be set on tressels, and a suitable grade could thus easily be obtained. A box of this description is constructed for three miles along the Gatineau River by Mr. Gilmour, and carries down all the lumber from his extensive mill past gigantic rapids that would knock the boards into toothpicks. This sluice runs along the bank, and conveys the boards to his piling grounds at the head waters of navigation. Automatic windmills are now constructed which work with very little attention, furling their sails should the wind increase to a gale, and trimming to the wind, of which a very small quantity is sufficient to start them going. In many places the water could be stored in ponds on high ground, and let on as the land required it, but in many instances the windmill would only require to be worked in the day-time, and the water run immediately on the land, when the attendants could direct its course.

The most suitable soil for irrigation is that of a sandy or gravelly nature, and the effect of water on these gives immediate proofs of its efficacy; on the other hand, when heavy tenacious soils are treated in the same way, they require a thorough system of drainage, which in some instances would be too expensive to enable the owner to receive any profit. Another thing must be kept in mind, and that is, that on tenacious or clay lands the supply of water ought to be almost unlimited, as they bake dreadfully if it is not copiously turned on.

Many people in towns appear to think if they can attach a hose to the supply pipe, and by that means spout the water over the garden like a shower of rain, they are doing big business; in this they are to a great extent mistaken. In the first place, water should not be applied in this way during the time the sun is shining, as very few plants will stand the scorching sun on their wet leaves, and it is death to the finer kinds of vegetables and flowers, especially those edible plants grown for their foliage. In the second place, it is the *soaking of the ground that is required, not the wetting of the plants.* This should be done

by running water into gently sloping channels from eight to ten feet apart; no water should be allowed to remain standing on the soil. In irrigating arable land, no collecting drains are required to catch the surplus water, as in the case of irrigating grass lands, because the water is all absorbed into the soil. If the water is not absorbed, either the slope is too great or too much water is applied. In the case of the culture of small fruits and strawberries, the water should be applied in shallow drains between every two rows; if the season is entirely without rain, once a week will not be found too often to irrigate, but a thorough soaking should be given each time by dividing the land into sixths, part of which could be gone over each day or night. The season of ripening is thus much prolonged, and the last berry pulled will prove as fine and as well formed as the first one gathered.

P. E. Bucke.

Ottawa, 17th November, 1875.

HYBRIDIZING.

By P. E. Bucke, Ottawa.

The F. G. Association has been in existence for ten years, and though it had very up-hill work in struggling into existence, it is now assuming very fair proportions, and its members number about two thousand. We believe this little army of enthusiasts in fruit culture would be very much increased were the benefits derived from the Society better known and appreciated. At the autumn meeting, held in the Town Hall at Belleville on the 5th and 6th October, some of its advantages were brought out, and amongst them the one selected for our text—Hybridizing—that is, the crossing of two varieties of the same species of plants by artificial means. The results produced are exceedingly interesting both to the cultivator and to science.

The art of hybridizing has long been known, but its practical application is only just being utilized on this continent as a means of adjusting foreign fruit, from dry, hot countries, or those of damp, cool regions, to our cold winters and hot dry summers.

The art of hybridizing requires some knowledge of botany and a little delicate manipulation. The first process is to open the flower artificially, just before it would do so of itself. We will take the grape flower for an example: remove the little cap that covers the pistil with a pair of forceps, then take away the male organs or anthers; so soon as the flower buds selected are thus prepared, they must be enclosed in a paper bag until properly suited for the application of the pollen.

This may be from one to two days; but sometimes, if the buds are very far advanced, they may be acted upon immediately, and again in a very few days afterwards, which will increase the chance of success. Care must be taken to keep the flowers as closely covered over as possible, so that they may not be impregnated except by the hand of the operator. The pollen should be collected in a piece of blue paper, by holding it under some flowers, and jarring the vine several times, when a shower will fall. This should be quickly rolled up and excluded from the light, and may be kept for weeks to be ready to operate with. This is done by taking up some of the pollen collected in a camel-hair pencil, and applying it gently to the female organ or pistil; as before stated, this operation should be repeated in a day or two. The flowers should then be covered with a paper bag; of course, all on this bnnch not operated upon should be removed. When the fruit has formed, this paper bag may be taken off and one of muslin supplied, which should be kept on until the fruit is ripe, so that nothing can carry it away. The seeds should be sown in the autumn, and the next year plants will be obtained a foot in height. These should be taken up and removed to some secure place where they will not freeze, and be replanted again in the spring. Fruit may be expected on these seedlings in four or five years' time.

The female is usually selected for its qualities as a plant, the male for its size and flavour of fruit; because experience shows the former takes after the mother, the latter after the father. These being selected by the judgment and experience of the hybridist, he proceeds in his work as above described.

Our readers are probably aware that the kinds now designated as "native grapes" are all crosses between those known as "foreign" and the wild grape of this country. Foreign

grapes can only be grown in Canada under glass, for the reason that they are natives of warmer climates, with long summer seasons, and winters whose temperature scarcely touches the freezing point. Several of them are natives of the Holy Land, such as the Syrian and Palestine, whilst others are of more tropical origin. All these grapes do remarkably well in southern California, but for the western and north-western States and for Canada it was found that a mixture would be required between these fine sorts and the wild fox grape. This subject has occupied the attention of horticulturists for some thirty years. The little Delaware has long been the standard of excellence, though the size of berry has been much against it; some of Rogers' Hybrids are exceedingly choice, but their fault chiefly rests in setting thinly on the bunch. It is believed that Mr. P. C. Dempsey, of Ameliasburgh, has succeeded, by crossing the Hartford with the Black Hamburg, in producing a grape that will hand his name down to the remotest posterity. This new and beautiful fruit resembles the latter in bunch and berry whilst the flavour is not much, if at all, inferior. It takes after the former in hardiness of plant and earliness in ripening, and as far as it has been tested appears to have all the qualities of excellence combined. This grape, on account of the limited number of plants, would easily sell for $2 each, and is to be distributed *gratuitously* to every member of the Association in 1878, express charges paid, and its capabilities will then be fully determined in every part of Ontario.

One of the peculiarities of hybridizing is that the offspring may resemble both the parents, or be like only one of them; but in many instances, and, in fact, the greater number, they do not resemble either one or the other. It is not improbable that the laws relating to this part of the science may never be fully ascertained. Certainly, in one respect the laws of the vegetable kingdom do not follow those of the animal kingdom. It sometimes happens that when two *black* varieties of grapes are crossed they produce *white* ones. This is instanced in a peculiar way by one of the seedlings raised by Mr. Dempsey. The parentage is precisely the same as his Burnet, and the product is a white grape not yet named, but so highly thought of at the Belleville meeeting as to receive the highest approval of the Committee on Seedling Fruits, and the Directors' prize of $5. It is believed this grape will fill a much-needed place in Canada and the States as a really good outdoor white grape.

In dwelling on Mr. Dempsey's success, we have no desire to pass over Mr. Arnold, of Paris, Ontario, who, by patient labour in this branch of horticulture, has earned for himself the name of "Canada's great Hybridist." He has succeeded in raising a new variety of wheat, of rare excellence, having the hardiness of those with thicker skins, with the thin white rind of the tenderer sorts. In originating new varieties of grain or anything that is raised from seed, the hybridist has much more difficulty than in raising plants or trees propagated by grafts or cuttings, because the fruit of these must of necessity follow the stock from which they are taken; but crossed grains or seeds are apt to sport, and return to the original type, and the character is only fixed by selection; that is, culling out the kernels required, and rejeeting those which from shape and colour do not come up to the proper standard; thus it often takes several years to get what at first sight one would think was easily obtained. Mr. Arnold has also crossed the grape, the pea, the apple, the raspberry and the strawberry. Of the latter he has a thousand different varieties, some of them of great promise. One of his hybrid raspberries, "Charles the Bold," will be distributed in 1877, with one raised by Mr. Saunders, of London, Ont. This latter is one of the most successful crosses ever made between any two classes of plants. The parents are the Philadelphia and the Mammoth Cluster; the former is red and the latter jet black; the former is propagated by suckers, the latter by rooting at the tips of the canes. The new plant has a dark red berry; it does not sucker, but roots itself like the ordinary Black-cap family.

Mr. Saunders has also some very prominent gooseberries, which will equal in size some of those in Britain, whilst it is thought they will be proof against mildew, the great enemy of the English sorts on this continent. These have not yet been fully tested, but when they are no doubt they will be distributed through the Association, if found worthy by the officers of the Society.

Mr. Arnold has also made some very interesting experiments in hybridizing Indian corn. He found that by covering the ear of the yellow corn, and fertilizing it artificially with the pollen from the red, and a few days afterwards with that of the white, he produced three distinct kinds on the same ear, and by fertilizing with two kinds at once on a third different sort, he had three distinct colours in the same grain on the ear. This fact was considered of

such wonderful importance—as it had frequently been disputed by French savants—that it was translated into several languages, and generally copied into the scientific press of the civilized world. It is still true that "a prophet is not without honour save in his own country.' The modest, retiring Arnold, though little known in Canada, has a high reputation in the neighbouring Republic, his varieties of grapes and grains being quoted as desirable products in the catalogue of leading seedsmen.

It is utterly impossible, in so short an article on this subject, to give anything like the advantages to be derived from becoming a member of the Fruit Growers' Association. The meetings are full of interest, the Annual Report is replete with practical and valuable papers on fruits and fruit culture. The whole series are invaluable to any man about to set out an orchard or plant a small fruit farm in any part of the Province, giving as it does descriptions of the climate and its effect on trees and plants in every section of Ontario.

The meetings also draw people together from all parts, and exchanges of fruits are made, and the latest seedlings shown, and deserving plants may be had at moderate prices from reliable men. No such thing as dishonest pedlars amongst this fraternal guild.

The member's fee is one dollar annually, for which he receives in return some plant or tree, and the Annual Report of the Association, fully worth the money. The fee must be paid before the first of March each year, so that the member may get his donation of trees so soon as the spring opens. The freight on these packages being prepaid, some one in each locality generally acts as agent for the Society, but if not the subscription may be sent to any of the Directors, or the Secretary at St. Catharines. Any one sending his own name and four others will himself receive a double number of trees. His own address and that of the subscribers should be plainly written on a sheet of paper accompanying the remittance.

Besides the advantages above quoted, prizes of $15 and $25 are offered for essays on various subjects, and a gold medal is given for fruits of superior excellence, and exhibitors of seedlings, when they are thought worthy, obtain a prize for them of $5. In 1876 will be distributed the "Glass" seedling plum; the Report for that year will be embellished with a coloured engraving of the *two* hybrid raspberries of Messrs. Arnold and Saunders, to be sent out in 1877, and in 1878 the now celebrated "Burnet" grape will be distributed.

REPORTS.

PARK HEAD, 19th November, 1875.

To the Secretary of the Fruit Growers' Association of Ontario.

The following is my Report from Amabel for this season :—Beurre d'Anjou Pear; this is my fifth report of it; it has done well with me. The Blackberry and Raspberry never grew at all. Clapp's Favourite Pear and Grimes' Golden Pippin, third report of them; the Pear is doing well, the Pippin never grew. The Salem Grape (Rogers' No. 22), and Downing's Seedling Gooseberry; they have made a good growth, and wood ripened well. Flemish Beauty Pear and S. Pomme Grise, first report of them; the apple tree was dead when received and did not grow, the pear made a fair growth for the season. This has been the worst season I have ever seen in this section for newly planted trees, owing to the late, cold, backward spring and heavy drought setting in in the beginning of the summer. The fruit crop has also been very short, and no wonder, for we had frost in every month of this season. The month of May was very frosty. We had frost on the nights of the 12th, 13th and 14th of June, that killed the young growth of the grape vines, blacked a good many of the leaves of the fruit trees, even maple leaves were singed. This frost told severely on the fruit crop and most of all other crops. July, frost on the mornings of the 2nd and 11th. August, frost on the mornings of the 22nd and 23rd. September, frost on the morning of the 11th, that blackened the leaves of the grape vines; hail storm on the night of the 29th that injured a good deal of the fruit on the trees. October was mostly rough and stormy.

Yours truly,
WM. SIMPSON.

Report of Plants received from the Fruit Growers' Association of Ontario.

The Salem Grape has done well during the past season. It has grown to be a fine vigorous plant. The Downing Gooseberry is still alive and that is all, never having given evidence of much vitality since I received it in '74. I received the Swayzie Pomme Grise Apple and Flemish Beauty Pear in good time last spring. Both are living, the apple having made some considerable growth, and the pear having grown a little ; not the growth that might have been expected, considering the favourable season for growing and the amount of care the trees have received since planting. Had they both died, I should have felt no surprise, considering the condition in which they were when I got possession of them. In making such a statement, I do not wish to be understood as finding fault with C. Arnold, Esq., of Paris, from whose nursery these trees were sent out ; nor can I make any complaint against Col. A. M. Ross, of Goderich, to whom the trees for the County of Huron were consigned. I believe both of these gentlemen did their utmost to discharge their respective duties in a manner satisfactory to the members whom they supplied. The time it takes to transport necessarily keeps the trees a long time out of the ground. The change of the mode of conveyance requires a good deal of handling by railway hands, stage-drivers, &c., who don't care a rush for the success of your Fruit Growers' Association or anything else, only as little trouble as possible for themselves, and to whose tender mercies the trees are for a time abandoned. Of course a portion of the injury to the trees is unavoidable, when conveyed long distances by the usual means of transportation. The bark was much bruised, and in some places abraded, and the roots of the pear tree, which consisted of two principal roots, were pulled asunder, thus splitting the stock upward seven or eight inches from the base ; consequently had the trees failed to grow I could have attributed it to nothing but injury during transportation. And, not regarding my own as an isolated case, such a state of things must be considered unfortunate for the Association, as tending to deprive it of obtaining those results which it is mainly designed to accomplish. Therefore, I am of opinion that the suggestion contained in the last Annual Report, to the effect that the Association, in the future, would only distribute such plants as can be conveniently transmitted by mail, is a very good one, and one I feel confident will be readily endorsed by a large number of members living in remote sections of the Province of Ontario. Writing from memory, I think the above indicated determination of the Association will be found either in the Directors' Report of the annual meeting in 1874, or in the annual address of our able and worthy President.

The fruit crop of the present year has been very good in this section of Ontario. Of the different fruits cultivated an average crop has been realized in all instances, except, perhaps, the currant crop, which was a partial failure. The apple crop was a very abundant one, much above the average, and, remarkable to say, much less injured by the codlin moth than in 1873 or 1874, and the increase in the number of apples grown in 1875 over the other two years named will not begin to account for the difference in the number of apples injured. If the severe winter of '74-75 did not have the effect in some way of lessening their numbers, I have no other explanation to offer. Of one thing I am sure, it is not because the fruit growers of this section have put forth any efforts to lessen its ravages. They seem to be either ignorant of any means by which the depredations of the moth may be curtailed, or they devote their time and attention to other pursuits, and allow the codlin moth to continue on his way unmolested. This indifference on the part of the fruit grower has been exhibited in many portions of the Province of Ontario for many years past. But the Fruit Growers' Association is introducing a different state of things. It can be shown very clearly that it has already accomplished much to infuse new life into the fruit growing interests of this country by giving a great deal of information upon the proper method of fruit culture ; the varieties most suitable to Canadian climates ; the nature, habits and best means of destroying the different insects which interfere with the success which should attend fruit growing.

And the information is given to the public in a very readable form in the yearly Report, and is likewise further disseminated by the discussions which take place at the different meetings of the Association held from time to time in different localities of the Province. The Association thereby becoming an educator of the people, I look forward to

a much more successful career for the Ontario Fruit Growers' Association in the future than has taken place in the past, for the above mentioned reasons.

The annual grant from the Ontario Legislature is money well expended, and the legislators perform a good work when they appropriate that money for the use of the Association.

I was much delighted with the success of the Ontario Fruit Growers' Association at the exhibition of fruits at the meeting of the American Pomological Society, in the City of Boston, in 1873. Should the season of 1876 prove favourable, the results which may be obtained for Ontario at the Centennial Exhibition at Philadelphia will probably equal or perhaps excel those just mentioned ; whether or no, it will be of vast importance that the fruit growing capabilities of Ontario should be represented, seeing so many foreigners are likely to visit Philadelphia, and Ontario is particularly desirous of attracting immigrants to her shores. A few such successes as that attending the competition of the Ontario Fruit Growers' Association in Boston in 1873 will have the effect of making emigration to this Province a much cheaper affair than at present, and emigration agents might refer to these results with very good effect in the old and densely populated countries of Europe.

Before closing this Report, I wish to suggest that the Fruit Growers' Association might very materially increase its usefulness by enlarging its sphere of action so as to take into consideration the cultivation of shade and ornamental trees, shrubs, &c., making itself as comprehensive as the State Horticultural Societies of the neighbouring Republic. It is unquestionably a matter of very great interest and importance. The cultivation of trees is not only attended with pleasure, but is beneficial in many ways. No home now-a-days can be said to be complete without being ornamented by a growth of trees. The beauty of a place is much augmented by a few well-selected shade or ornamental trees planted here and there, especially if they are planted according to the rules of ornamental or landscape gardening.

The beneficial results accompanying their culture are numerous ; the cooling shade they afford is known and appreciated by all, the effect they have upon the temperature is appreciable, heat is constantly radiating from their surfaces, a matter of no small moment in such a climate as ours. This is especially the case with evergreens, and if these were interspersed in planting with our fruit trees, the process would be of much value to the less hardy kinds, besides the protection from high winds. Tree planting is of great consequence in the way of forming shelter belts on exposed places. Orchards and no doubt agricultural lands would be the better of being surrounded by such defenders from the prevailing winds of this country.

Then there is the fact of the present stock of timber becoming exhausted ; it will be at a somewhat remote period no doubt, but the time will come when tree culture will become a necessity. In some countries, at the present time, owners of forest lands are compelled by law to plant a tree for every tree used, and what is now true of such countries will in time be true of this.

But the most important reason for the cultivation of trees is to be found in the fact that they are purifiers of the atmosphere. The recognition of this fact is more particularly of value to large cities and towns where the population is dense. One of the chief constituents of vegetable food is carbonic acid gas, found in the air ; and being a poison, if allowed to accumulate in the air, would be destructive to animal life. The breathing of animals would very soon surcharge the atmosphere, as they emit carbonic acid gas at every expiration, thereby tending to render it unfit for the maintenance of animal life. It is also formed from decomposing animal and vegetable substances constantly going on and constantly pouring this poison into the air.

The injurious accumulation of this gas in the atmosphere is prevented by plants continually absorbing it for their own sustentation. A reciprocal action between the two kingdoms, animal and vegetable, is always in progress, whereby the life and welfare of each is promoted and sustained. It would be the duty of a Society thus constituted to guide the public mind to a right and proper understanding and appreciation of these and many other facts in connection with the subject under consideration. I am satisfied that hitherto this matter has not received that attention that its importance demands. The happiness, health and prosperity of the people will be increased as soon as this subject receives at their hands that consideration it deserves.

S. B. Smale, M. B

Wroxeter, Dec. 11th, 1875.

FRUIT LIST FOR QUEBEC, &c.

The following is a digest of the fruit list for the Province of Quebec, published by the Fruit Growers' Association of Abbotsford. It will be applicable to most of those parts of the Dominion where the winter is not modified by the presence of open bodies of water.

This Association, feeling the necessity of a published fruit list, issued last January 290 circular letters of inquiry to gather the varied experiences of the different parts of the Province. Replies were received from, or correspondence or discussion held with, over one hundred, exclusive of residents of Abbotsford. The information is chiefly from the Island of Montreal, from the Counties of Ronville, Brome, Missisquoi and Huntingdon, and the country lying between them, the clay flats excepted, from which there are no favourable reports.

Apples—Summer.

Two best varieties are—1. Duchess of Oldenburg (most satisfactory). 2. Red Astrachan (pretty generally satisfactory). We also mention Early Harvest (usually quite short-lived); Tetofsky (promising to be valuable where Red Astrachan does not thrive); White Astrachan; Peach (not described by Downing; very hardy and productive, and valuable for near market).

Apples—Fall.

Two best varieties are—1. St. Lawrence. 2. Alexander. King of the Pippins, Keswick Codlin, Kentish Fillbasket and Hawthornden, also valuable.

Apples—Early Winter.

Fameuse first, without a rival. We also mention Late Strawberry (though short-lived, valuable), Bourassa (not valuable as formerly).

Apples—Late Winter.

Many competitors, none first; choose from these next six:—1. Golden Russet of Western New York (pretty hardy, and rather productive). 2. White Calville (long-lived and a heavy bearer, its fault being its colour). 3. Canada Baldwin (good, except that the older trees sun scald). 4. Blue Pearmain (not generally productive). 5. Ben Davis (promising to be very valuable, though wanting in flavour). 6. Jonathan (trees 17 years planted have done *well*). Northern Spy (reports most contradictory; being planted for profit on exposed northern slopes, and in other sheltered places; thoroughly condemned by nurserymen and orchardists); Pomme Grise (reports unsatisfactory as to bearing, and no longer saleable at extra prices); Ribston Pippin (not often reported favourably); Tolman's Sweet (fruit not saleable); Yellow Bellefleur (often satisfactory); Baldwin's Rhode Island Greenings and Spitzenburgs (condemned by nurserymen and orchardists, having done well only in exceptional instances).

Apples for Profit.

The best five kinds in order of preference:—Huntingdon County reports Fameuse and Red Astrachan a tie; next, Duchess or St. Lawrence. Lacolle and vicinity:—Fameuse first, unanimously; next, St. Lawrence, Red Astrachan, and, possibly, Canada Baldwin. District of Bedford:—Fameuse or Red Astrachan, followed by some winter apple. Belœil:—Fameuse, unanimously. Abbotsford:—Fameuse, St. Lawrence, White Calville, Duchess, Alexander. Rougemont:—Red Astrachan, Fameuse, St. Lawrence and Alexander. Ottawa Valley:—Fameuse and Duchess equal, Red Astrachan, St. Lawrence. Montreal:—Red Astrachan, Alexander, Fameuse, Duchess and Peach; Red Astrachan bringing $2 per bushel when grown in the neighbouring orchards. Of winter apples, Golden Russet is reported from Montreal as less fruitful than Fameuse, and lower priced, because of the competition from Ontario. In Huntingdon County it is being planted for profit; so also are Ben Davis and Jonathan, and even Northern Spy.

Apples—Hardiness.

Hardiest kinds in order of preference:—Tetofsky, Duchess of Oldenburg, White Astrachan and Peach; next to these, in alphabetical order, Alexander, Ben Davis, Fameuse, Red Astrachan, St. Lawrence. Tetofsky assumes this position partly from its hardiness in the north-eastern and north-western States.

Crabs.

Our statistics give us, in order of preference:—Montreal Beauty, Transcendent, Queen's Choice (very hardy in unfavourable localities), Red Siberian, Montreal Waxen (considered by some the most profitable for the Montreal market), Hyslop. The Montreal Waxen is that known in Ontario and United States as M. Beauty.

Pears.

We give a digest of the experience of a few in Montreal, therefore a *local* experience, to be received with great caution:—

Shelter by buildings, hedges, &c., almost necessary; trees must not be forced in nursery, nor in orchard, until in bearing; none recommended for profit. The best five kinds are—Flemish Beauty, Belle Lucrative, Glout Morceau, Lawrence, White Doyenne. These last four not in order of preference. The following also deserve special mention:—Beurre Diel (reliable), Bon Chrétien (perhaps not as good as it used to be), Bartlett (not as hardy as some), St. Ghislain (very hardy), Napoleon, Onondaga, Louise Bonne de Jersey (reports contradictory as to its hardiness), Howell, Oswego Beurre (very hardy), Osband's Summer, Rostiezer, Kingsessing, Clapp's Favourite (promising to be very hardy).

Plums.

The best twelve varieties are—Lombard, Pond's Seedling, Washington, Imperial Gage, Bleeker's Gage, Bradshaw, Coe's Golden Drop, Prince's Yellow Gage, Green Gage, Nota Bene (Corse's; blue, 1½ inches in diameter, finest flavoured of Corse's seedlings), Dictator (Corse's; nearly as large, and shape of Yellow Egg, profitable), Admiral (Corse's; nearly size of Dictator, not equal in quality, but heavier bearer). A second list would contain Damson, Reine Claude de Bavay, Yellow Egg, McLaughlin, Jefferson, Blue Gage, Smith's Orleans and Purple Favourite. The above kinds have lived twelve or fifteen years, usually not much longer, and have produced good crops more or less frequently, according to variety and favourableness of situation, showing that we have not the species adapted to our climate.

Blue Orleans, Pruneau, and Yellow Orleans; many thousand of these, especially the former, grown from suckers, planted in the sod, are doing well near Quebec. They sell in Montreal at from $6 to $14 per barrel, and should be tried in other parts of the Province.

Cherries.

The common kind reported under the names of Early Richmond, Kentish, &c., is that most grown. Morello and May Duke reported favourably in a number of instances. The Minnesota State Horticultural Society recommend Hartz Mountain.

Grapes.

Summer protection by fences, &c., and winter covering, both necessary. Best four kinds—Hartford Prolific (for careless cultivators and for profit), Adirondac (most valuable, but needs a little nursing), Creveling, Delaware. The following deserve special attention:—Concord (ripens thoroughly only in certain places), Eumelan (fruited but two years, reports satisfactory), Rebecca (doing well in the hands of a few careful cultivators), Massasoit and Salem (reported favourably), Rogers' No. 33 (at Philipsburg doing so well as to demand special attention).

Currants.

In Province of Quebec as elsewhere.

Gooseberries.

The English varieties often mildew, yet some places seem free from this trouble. We have seen Whitesmith, thirty years planted, which have never mildewed, still yielding good crops, lower branches lying upon the gravelly ground. Also, upon heavy clay, Crown Bobs and Whitesmiths, both bearing heavy crops, both trimmed and untrimmed. Houghton flourishes everywhere.

Raspberries.

Red—Red Antwerp, most largely grown, though some prefer Franconia, Fastolff, or Knevet's Giant. Clark (coming into favour, canes hardy). White—Brinckle's Orange (*the* favourite, canes much hardier than those to the south of us would suppose). Black—Doolittle (perfectly hardy), Mammoth Cluster (hardy enough in soils not over rich).

Blackberry.

Kittatinny, Dorchester and Lawton killed almost to the ground, even when covered by a snow drift; Early Wilson hardier, but not satisfactory.

Strawberry.

For market, Wilson, one opinion to the contrary—one who has five acres at Quebec, on bituminous shale, prefers Jucunda and Burr's New Pine. For home use, Wilson and Triomphe de Gand.

Committee, { N. Cotton Fisk.
John M. Fisk.
Joseph Roach.
Charles Gibb, *Corresponding Secretary.*

From *Canada Farmer*, Sept. 15th, 1875.

How to Transplant Trees Successfully.

Mr. John H. Rutherford, of Dumfries, writes to the Secretary that in the spring of 1875 he planted sixty-four apple trees on a piece of ground that was cultivated to potatoes the previous season. The ground was ploughed this spring, and the trees planted the first week in May. "In planting," he says, "I spread the roots well apart and cut off the roots that ran straight down, and trimmed the tops pretty well after I had them planted. Before the dry weather set in, I put some rough manure around them and covered it with clay. The sixty-four trees are all growing well. A good many of them made a growth of from twelve to fifteen inches this summer, and are as far advanced as those of some of my neighbours who planted three years ago."

REPORT FOR 1875.

To the Fruit Growers of Ontario.

This year has been a complete success in fruit culture, except the peach and plum. The curculio has been more troublesome on the plums than any previous year; they have destroyed nearly all my entire crop. I think the cool weather has been the cause of so much destruction to the plum. The codling moth this year has not been so destructive. My apples are the finest saleable crop I ever raised previous to 1874. My whole fruit garden had a very bad appearance, with very imperfect fruit, and nearly every apple was stung. I began to think something should be done. The orchard had been in sod for five years, and in the spring of 1874 I made up my mind to try leached ashes. I applied 350 bushels per acre,

and the change made a marked effect in the colour of the foliage and the vigour of the young shoots. I also noticed a gradual falling off of the codling moth.

This year shows a remarkable difference on the year '74 ; the moth is not worthy of notice. An inquiry from some of our scientific men, whether it was the ashes that was the cause of such an abundance of fruit, would be thankfully received.

JONAS NEFF.

REPORT OF TREES RECEIVED FROM ASSOCIATION FOR 1875.

This year I can give a favourable report on part of the trees received for time past since I have become a member of the Association.

My Beurre d'Anjou Pear has died, but the Goodale Pear and Clapp's Favourite are growing well, also my Beurre Clairgeau. My McLauchlin Plum is growing fine. Grimes' Golden Apple and Downing Gooseberry have died, also my Swayzie Pomme Grise. My Salem Grape is growing well. I cannot give a very favourable report of the Mammoth Cluster Raspberry and the Wilson Blackberry ; they are both alive, but I consider them almost worthless. The blackberry does not stand the winter. The raspberry stands the winter, but it bears but a small crop and small-sized fruit. Therefore I consider them worthless. Hales' Peach is doing well.

Yours &c.,

JONAS NEFF.

GREENOCK, January 21st, 1875.

To the Secretary.

I write these lines to inform you how we are getting along with our young orchard, as it is progressing wonderfully. The trees which we got from your Fruit Growers' Association are doing finely. The pear tree and Wagner apple tree, distributed in 1872, are doing extremely well. The next succeeding spring they were planted here, both of them were covered with blossoms. In a short time after spring, the apple tree had nineteen apples formed on it, growing very rapidly to the size of plums. We took them all off except four, as we knew so many would be injurious to so young a tree. The neighbouring farmers were very much struck with its appearance, and many others which had a look at it. They were not long in deciding on the spot to become members ; but I think they have forgotten their resolutions. These same trees also had blossoms again last spring, and fruit was again formed on the Wagner tree, but the dry summer took them off ; as also a large quantity of fruit was withered off from the larger trees. The Grimes' Golden Pippin apple and Clapp's Favourite pear, distributed, in 1873 are growing well. They have not appeared in blossom, but they have time enough yet ; also the Downing Gooseberry and Barry Grape are still growing. They had to be nursed very carefully this dry summer. We had a good number of our evergreens killed with the extraordinary dry weather. We have got a splendid spot for an orchard. It is a gentle rising slope, descending towards the south. It is a soft clay loam, with gravel subsoil. We have about two acres planted ; but we intend to enlarge it yet. We have it seeded down, mostly clover, for three years. We try as much as possible to keep the grass off the trees. We give them stable manure and leached ashes occasionally, as it seems to suit them very well. We were intending to give them a good heavy coat of black rot this last fall ; but I have had delicate health, and the farm work all depending on my brother John and father, we did not get it accomplished. We can get this splendid manure in any low, flat place on the farm, as in some places it is several feet deep. If spared, we will have to plant quite a number of evergreen trees, as a shelter for orchards is much needed in this country. This most valuable protection is very much neglected here amongst us farmers. They seem to take no interest in it all. I have often observed their careless manner with orchards. The trees may be planted all well enough ; but when this is done, they are left

to care for themselves, and grow up into a wild state from neglect. The wild grass is allowed free scope around their trunks and roots, and the trees get black and covered with moss, and then some of these farmers grumble because their trees don't bear. I have also observed a great many who are careless about fencing their orchards, allowing the stock to run at large amongst their trees, and pruning them in a very wild and unbecoming manner, and killing many of them entirely. This neglect is allowed more generally in fall and winter, as the other farm crops are then secured. I have seen this to be the case with a great number, as I have no doubt, dear sir, you may have also observed the same.

Dear Sir, I could mention many other instances of carelessness and neglect in this way, but I shall forbear, as I do not wish to intrude on your time in occupying your attention with this old careless method of bringing forth fruit. We have some farmers who are a contrast to others, as they take an interest in nursing their fruit trees and plants, and are wonderfully rewarded for the little attention they give them; but in this district I think this faithful few will still increase. We have received considerable knowledge from the experiments given in your Yearly Report of the Fruit Growers' Association, as it contains a host of valuable information. I have preserved the three numbers which we have received since my father joined as a member thereof. I may justly say that the Report alone is worth the yearly subscription, as it treats on the many different subjects that come under its notice.

Excuse my freedom for writing thus,

And I remain,
Your humble servant,
THOMAS HALL.

Address:
Greenock,
Pinkerton P. O.,
County Bruce,
Ontario.

I herewith send you a report of trees from the Fruit Growers' Association. The Beurre d'Anjou Pear is doing well; the Wagner Apple had four apples; Clapp's Favourite Pear is doing well; Othello Grape, loaded with fruit, very good; Downing Gooseberry had some fruit, and the Salem Grape had three bunches of grapes.

DAVID LUTZ.

St. Catharines, 1875.

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ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY OF ONTARIO,

FOR THE YEAR 1875.

INCLUDING REPORTS ON SOME OF THE NOXIOUS, BENEFICIAL, AND OTHER INSECTS OF THE PROVINCE OF ONTARIO.

PREPARED FOR THE HONOURABLE THE COMMISSIONER OF AGRICULTURE, ON BEHALF OF THE SOCIETY,

BY

WILLIAM SAUNDERS,

President of the Entomological Society of Ontario; Editor of the Canadian Entomologist;

REV. C. J. S. BETHUNE, M.A.,

Head Master of Trinity College School, Port Hope; Vice-President of the Entomological Society of Ontario;

AND

R. V. ROGERS,

Barrister, &c., Kingston, Ontario.

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1876.

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REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO FOR THE YEAR 1875.

To the Honourable the Commissioner of Agriculture.

SIR,—I have the honour to submit for your consideration the Report of the Entomological Society of Ontario for the year 1875, in which you will find a detailed statement of the receipts and expenditures for the year, all of which have been duly audited. I also submit a list of the office-bearers elected for the year 1876.

In accordance with the provisions of the Statute, the annual meeting of the Society was

held at the City of Ottawa, at the time of the Exhibition of the Agricultural and Arts Association, when the Reports of the officers were presented and approved of.

With the view of carrying out the design of the Department in endeavouring to advance the knowledge of practical entomology, especially in its bearings on Agriculture and Horticulture, the members of the Entomological Society submit herewith the Annual Report on some of the noxious, beneficial and common insects found throughout this Province.

The organ of the Society, *The Canadian Entomologist*, is still issued regularly on or about the 15th of each month, each number containing twenty pages 8vo. It has now nearly reached the close of its seventh volume, and fully sustains its reputation as a valuable scientific journal. Being almost entirely filled with original matter, it has during the past seven years been the means of disseminating a vast amount of scientific knowledge relating to Entomology, and thus doing much towards furthering the interests of this important department of natural history.

The pages of this Report will be found illustrated with a number of excellent woodcuts and electrotypes, many of which are entirely new, some having been especially engraved for this Report. The expensive character of this work has prevented us from illustrating as profusely as we would have wished, for we are persuaded that such figures add greatly to the usefulness and attractiveness of our Reports.

I have the honour to remain, Sir,
Your obedient servant,
J. H. McMechan,
Secretary-Treasurer Entomological Society of Ontario.

London, Ontario, November, 1875.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The fifth annual meeting of the above Society was held in the Court House, in the City of Ottawa, on the 22nd day of September, 1875, at 3 p.m. The reports of the officers were read, and a copy of the President's address promised to be placed at the disposal of the Printing Committee for publication.

The following officers for the ensuing year were then elected :—

President.—W. Saunders, London.

Vice-President.—Rev. C. J. S. Bethune, M.A., Port Hope.

Secretary-Treasurer.—J. H. McMechan, London.

Council.—Wm. Couper, Montreal ; R. V. Rogers, Kingston ; J. Pettit, Grimsby ; J. M. Denton and E. Baynes Reed, London.

Editor of Entomologist.—W. Saunders.

Editing Committee.—Rev. C. J. S. Bethune, M.A. ; G. J. Bowles, Montreal ; E. Baynes Reed.

Library Committee.—W. Saunders, E. Baynes Reed, J. H. McMechan.

Committee on Centennial Exhibition.—W. Saunders, Rev. C. J. S. Bethune, J. H. McMechan.

Auditors.—G. Geddes, Chas. Chapman, London.

The Library Committee reported the purchase of a number of valuable books for the Society's Library during the past year.

FINANCIAL STATEMENT OF THE SECRETARY-TREASURER.

Receipts.

To Balance from previous year	$422 16
" Government Grant towards Illustrations for Report	100 00
" Annual Grant for 1875	750 00
" Members' Fees	127 05
" Sales of cork, pins, &c., to members	46 34
	$1,445 55

Disbursements.

By CANADIAN ENTOMOLOGIST, printing and paper	$533 91
" Engravings for Report	134 64
" Expenses of Report	120 00
" Editor's salary	100 00
" Secretary-Treasurer's salary	50 00
" Expenses, sundry small	26 53
" Rent	80 00
" Insurance	10 63
" Library	107 51
" Advanced Centennial Fund	50 00
" Balance on hand	232 33
	$1,445 55

We certify the above as a correct statement of accounts for the year ending September 22nd, 1875, of the Treasurer of the Entomological Society of Ontario, as shown by the books and vouchers.

CHAS. CHAPMAN, }
J. H. GRIFFITHS, } *Auditors.*

REPORT OF THE COUNCIL.

At the close of this the fifth year of the existence of our Society, it is our pleasing duty to bear testimony to the fact that it still sustains its well-earned reputation. A knowledge of insects and their habits, which it is the special object of our Society to advance, is now generally recognised as of great value to the farmer, fruit grower and others; and in view of the immense destruction insects entail, the money value of such knowledge, where it enables the cultivator of the soil to combat successfully the ravages of these formidable foes, is a matter of no small moment.

Branches of our Society are still in active existence in London, Kingston and Montreal, where they are doing much to advance the interests of our favourite study. The members of our Montreal branch have been particularly active during the past year, as will be seen from the Reports of their officers herewith submitted, and they have individually furnished many interesting papers for the Entomologist on the insects found in their district.

A request having been made that our Society should prepare a collection of Canadian Insects for the Centennial Exhibition to be held in Philadelphia during the coming year, and a grant sufficient to cover a portion of the expense having been recommended, we are gratified to know that our members have entered most heartily into the work, and many of them have placed their entire collections at the disposal of the Committee appointed to make the selection of specimens. We doubt not but that this collection will be a most interesting feature in the Canadian Department of the Exhibition, and will be in every way worthy of our Society and country.

During the past year death has deprived us of one of our esteemed honorary members, the first elected by this Society, and one who has generously donated to our Society's cabinets many objects of interest, and contributed to our Journal many valuable papers. We allude to the late Francis Walker, of the British Museum. One of our valued American contributors has also passed away, Mr. Philip L. Sprague, of Boston, Mass. Brief obituary notices of both will be found in the Report.

At the meeting of the Entomological Club of the American Association for the Advancement of Science, recently held at Detroit, our Society was represented by Mr. W. Saunders, Editor of the ENTOMOLOGIST. Many interesting facts in reference to insect life were elicited at the various meetings held by the Club, and some important conclusions arrived at affecting the welfare of Entomology. An account of these meetings will be given elsewhere.

The publication of the organ of the Society, the CANADIAN ENTOMOLOGIST, is still

vigorously maintained, and has now nearly reached the close of its seventh volume. Its regular issue and wide distribution throughout the scientific world makes it a valuable medium for the publication of scientific matter relating to insects, which, while of immediate interest to only a portion of our readers, is of great importance to those engaged in the study of the science of Entomology, and has also an important bearing on its future progress. Constant effort has also been made to present to our readers some practical information in reference to many of the commoner insect pests, with instructions as to how to recognize them, and as far as possible subdue them. It is gratifying to learn that our efforts in connection with our Journal are everywhere warmly appreciated by those who are best able to judge of its merits.

Submitted on behaf of the Council by
J. H. McMechan,
Secretary-Treasurer.

ANNUAL MEETING OF THE LONDON BRANCH.

The annual meeting of the London Branch of the Entomological Society of Ontario was held on the 21st of January, 1875, at the residence of Mr. A. Puddicombe.

After the usual routine business had been attended to, the following officers were elected for 1875: President, H. P. Bock; Vice-President, Gamble Geddes; Secretary-Treasurer, J. M. Denton; Curator, Chas. Chapman; Auditors, J. H. McMechan and J. H. Griffiths.

The Annual Report of the Secretary-Treasurer was read and adopted. This Report showed that the finances of the Branch were in a satisfactory state; that after meeting the current expenses of the year, there still remained a small balance to credit.

REPORT OF THE COUNCIL.

The Council of the London Branch of the Entomological Society of Ontario beg to submit the following Report:—

The monthly meetings of the members have been fairly kept up, and an increasing interest manifested by our more active members in Entomological matters. During the year some valuable additions have been made to our collections, and at our meetings we have had many interesting discussions on insect life and habits.

When the question of the preparation of a collection of insects by the Parent Society for the forthcoming Centennial Exhibition was first mooted, our members all expressed a hearty interest in the undertaking, and the following resolution was unanimously passed: "That the London Branch of the Entomological Society of Ontario, having heard of the proposal on the part of the Parent Society to prepare a collection of Canadian insects for the Centennial Exhibition to be held in Philadelphia in 1876, Resolved, That we heartily endorse the proposed scheme, and that we will willingly place any insects we may have in our individual collections at the disposal of any Committee which may be appointed for the purpose, and will do our best in every way towards making the collection one worthy of the Society of which we form a part." We doubt not but that our members will well redeem the pledge thus given.

It becomes our painful duty to record the death, during the past year, of one of our esteemed members, Mr. M. L. Morgan, who was Vice-President of our Branch in 1873. Although not an active working Entomologist, Mr. Morgan always took a lively interest in the affairs of the Society, and was ever ready, by his counsel and otherwise, to aid in furthering its welfare. His sudden removal has left a blank in our midst which will not be easily filled.

Submitted on behalf of the Council by

Gamble Geddes,
Secretary-Treasurer.

ANNUAL MEETING OF THE MONTREAL BRANCH.

The second annual meeting of the Montreal Branch of the Entomological Society of Ontario was held on May 4th, 1875, when the following officers were elected for the ensuing year :—

G. J. Bowles, President ; Alexander Gibb, Vice-President ; C. W. Pearson, Secretary-Treasurer ; G. B. Pearson, Curator ; W. Couper, M. Kollmar, T. B. Caulfield, Council.

The Reports of the Council and Secretary-Treasurer were read and adopted. The Branch is progressing steadily, and our list of membership is increasing. During the past year working expenses have all been paid, leaving a balance on hand ; a number of papers have been read, and the exhibitions of local and exotic rarities were exceedingly good. The Branch holds its meetings in the rooms of the Montreal Natural History Society, University Street. All business communications to be addressed to C. W. Pearson, the Burland Desbarats Company, Montreal, P. Q.

ANNUAL REPORT OF THE COUNCIL OF THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Your Council, in presenting their second Annual Report, have great pleasure in stating that the Branch has progressed steadily since its first meeting in August, 1873. During the past year eight new members were elected, making the total number of twenty, one of whom has since gone to Europe.

The papers read during the year are as follows :—

"Notes on the Larva of *Leucania pseudargyria* Gueneé," by F. B. Caulfield ; "On a Dipterous Insect Destroying the Roots of Cabbage," by Wm. Couper ; "Notes of Some Species of the Genus *Grapta*, found in the Vicinity of Montreal," by F. B. Caulfield ; "On Tineidæ," by Wm. Couper ; "On Tineidæ," by F. B. Caulfield ; "A List of the Bombycidæ of Quebec," by G. J. Bowles ; "On the Catocalidae Occurring in the Vicinity of Montreal," by C. W. Pearson ; "A List of the Diurnal Lepidoptera Occurring on the Island of Montreal," by F. B. Caulfield ; "On the Usefulness of Spiders," by J. G. Jack ; "A List of Sphingidae Occurring on the Island of Montreal," by F. B. Caulfield.

The monthly meetings were fairly attended, and the exhibitions of Entomological material conspicuously illustrated the energy of the members in accumulating rare insects from various localities. The Branch having decided to hold their meetings in future in the rooms of the Montreal Natural History Society, it was found necessary to change the night of meeting from the first Wednesday to the first Tuesday in each month, and in order to meet the extra outlay for rental, it was decided to make the subscription twenty-five cents a month, which the Council presume will suffice for present emergencies. On the 1st of last July the members proceeded to Chateauguay Basin for a field day. The members were the guests of Mr. R. Jack, of Hillside, who treated them with true hospitality.

Your Council have ordered *Psyche*, a useful Entomological publication issued in Cambridge, Mass.

A suggestion made by your Council last year, that note books should be carried by members, has, in this instance, been fruitful in producing valuable lists and data of the occurrence of insects in our neighbourhood, and we trust that some of our members will devote their leisure this season to the much-neglected orders of Hemiptera, Neuroptera and Diptera.

All of which is respectfully submitted.

G. J. Bowles.
C. W. Pearson.

Wm. Couper, Chairman.

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, 1875.

To the Members of the Entomological Society of Ontario :—

Gentlemen,—For the fifth year in succession I find myself called upon, as your President, to address a few words to you on the condition of our Society, and on the subject of Entomology in general.

With regard to the Society, you have already learnt, from the satisfactory Reports of the parent organization and its various branches, that it continues to go on prospering in a quiet, unostentatious way. While there has been no marked increase to our list of members during the past year, and no performance of any work of unusual importance, yet it is a matter of congratulation that we have no falling off, either in numbers or resources, to deplore. Much of the inactivity in Entomological matters that has been apparent in this country during the past year may no doubt be ascribed to the prevalent "hardness of the times," which has occasioned—even to those least affected by it—much anxiety of mind, conjoined very often with increased absorption in the cares of business, or in the labours necessary for obtaining a livelihood. As you are well aware, we have in Canada but very few persons of assured wealth who are able, as in older and richer countries, to devote their abundant leisure to literature, art or science. Consequently, the condition of things in the world about us deprives most of our members of the leisure, if not also of the inclination, requisite for the successful pursuit of Entomology in any of its various phases. Before another season opens upon us, however, we have reason to believe that the worst of the present financial storm will be over, and that renewed confidence and prosperity throughout the country will remove the gloom and dulness now oppressing almost every department of work among us. With a revival of business, we may assuredly look for a restoration of activity in scientific pursuits, and hope that our Society, in common with others of a kindred character, may be distinguished by large accessions to its numbers, and by increased work in all its departments.

Last year, at our annual meeting, I took the opportunity of calling your attention to many fields of Entomological labour that are now all but unexplored in this country. May I repeat that there is ample scope for the exertions of all our members, whether they care only to form collections of specimens, or prefer to devote their labours to the unfolding of the life histories, or the study of the classification of insects? There is plenty of work remaining to be done, even in the favourite orders of Lepidoptera and Coleoptera, to say nothing of the others that are not so generally studied or collected. It would be a valuable contribution to our store of knowledge were lists of the Canadian species of all orders of insects to be formed and presented to the Society for publication, and at the same time a revision made of those published some years ago.

But not only is there scientific work of this kind to be performed, which will require generations for its complete achievement; there comes before us at the present moment an extraordinary object for accomplishment during the approaching winter. I allude to the representation of the Society by means of a collection of Canadian insects at the approaching Centennial Exhibition at Philadelphia. You will all, I think, agree with us in the belief that it is a matter of great importance to the Society that it should be brought in this way before the notice of the world, and that it cannot but be of some benefit to the Dominion that its natural history, as well as its industrial resources, should be fully exhibited. The Council of the Agricultural and Arts Association have already, on our behalf, brought the matter before the Commissioners appointed by the Government, and we understand that a sum of money will be provided to aid us in the satisfactory performance of the work. To gather together a fitting collection of insects, and to prepare them for exhibition, is a task that will strain to the utmost all the resources of the Society. We have commenced the work, relying upon the co-operation of you all, and now we trust that every one will help us by the loan of specimens, and any other aid that can be afforded. The Society is committed to the task; let us see to it that there be no failure.

Before turning from matters immediately affecting our Society, I may mention that our periodical, THE CANADIAN ENTOMOLOGIST, continues to be maintained with undiminished efficiency and interest, being largely supported and contributed to by our Entomological brethren of the United States; and that the last Annual Report presented by the Society to the Legislature has been received with more than usual marks of favour by the Press, scientific, agricultural and political, not only in Canada and the neighbouring States, but also in England. We have been naturally gratified to observe that, in many instances, copious extracts have been made from its pages, and even a whole article reprinted in an English scientific magazine.

Having referred thus far to our Society, and the things that especially concern it, let me now say a few words regarding Entomological matters in general. At the annual meeting of the American Association for the Advancement of Science, held in August last at Detroit,

Michigan, the general Entomological Club, organized last year at Hartford, met for the first time. Its sessions, held daily throughout the week of meeting, were remarkably interesting. They were presided over by Dr. Le Conte, undoubtedly the greatest of living American Entomologists, and were attended by a great majority of the noted Entomologists of this continent. Our own Society was most efficiently represented by our able Editor, Mr. Saunders. I much regret that the pressure of business matters at home prevented me from accompanying him, as I fully intended to have done. As a complete report of the proceedings is being published in THE CANADIAN ENTOMOLOGIST, I need not detain you by any account of them here. Next year the meeting is to be held at Buffalo, N. Y.—a place even more convenient of access for Canadians than Detroit. We trust that a large number of our members will avail themselves of the opportunity—which may not occur again for many years to come—of attending the sessions, and making the personal acquaintance of our American brethren. From past experience I can assure them of a hearty welcome, while no one can doubt that more valuable information can be acquired in a few days, in an assemblage of this kind, than can be obtained in years of solitary work.

During the season that is now all but brought to a close, there has occurred nothing of a very startling or unexpected character. The Colorado Beetle has continued to extend his ravages throughout our country, but he has been met by such a determined and universal resistance that his work of devastation has been hardly appreciable ; certainly in the central portion of this Province we have never had a finer crop of potatoes, both as regards quantity and quality. The Cabbage Butterfly (*Pieris rapæ*), to which I also referred last year, has been rapidly extending to the west, and has already become a common object in the neighbourhood of London. So closely, however, does its parasite (*Pteromalus puparum*) follow in its wake, that where a year ago it was most destructive to all its food-plants, it has this season wrought but a moderate amount of damage. The Locusts, or Grasshoppers, of the west (*Caloptenus spretus*) have continued to commit much havoc, though not by any means on the frightful scale of last year ; there is every prospect that the destitution and suffering then occasioned by them will not be repeated to any very great extent this year. While there has been, upon the whole, a decided diminution in the amount of loss occasioned by noxious insects during the past year, we have, nevertheless, to record an increase in the numbers and consequent power for evil of several common species that are always more or less abundant. Among the most notable I may mention the Army Worm (*Leucania unipuncta*), which has wrought much damage in the maritime Provinces of the Dominion, as well as in some portions of the United States ; the two species of Tent Caterpillars (*Clisiocampa Americana* and *Sylvatica*), which have been excessively abundant and destructive to fruit and forest trees in many parts of this Province ; and the Pea Weevil (*Bruchus pisi*), which we much fear may soon become—unless measures are taken to prevent it—a source of great loss to our agriculturists. These I mention as having had a more than usual manifestation this year. But I need not detain you with any account of the ordinary work of our insect friends and foes, which are so familiar to every one in this country.

As I mentioned at the outset, you have done me the great honour of electing me your President for five years in succession. While I thank you most cordially for your kindness and consideration so repeatedly shown to me, I feel that it is only reasonable that I should now make way for some one else, who may be able to devote more time and energy to the interests of our Society, and be of more real use to it than I have latterly been capable of. I beg, therefore, to resign into your hands the office that you have so long honoured me with ; at the same time, I desire to say that I shall continue always to have the welfare of the Society at heart, and that I shall ever be ready and willing to do all that lies in my power to advance its best interests.

Again offering you my respectful thanks,

I have the honour to be, Gentlemen,
Your obedient servant,

CHARLES J. S. BETHUNE.

Trinity College School,
Port Hope, September, 1875.

ANNUAL ADDRESS OF THE PRESIDENT OF THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

GENTLEMEN,—Members of a young Society, especially those who are verily sincere, when they learn that their institution is progressing indeed, become imbued with a sense of pleasure, and I am gratified to state that the Entomologists (the majority of whom are young beginners) who meet in this city have made a worthy advancement in their investigations during the last year. At its inception, I had a doubt with regard to the attention which persons joining us would give to the study of our local insects, but such a thought has been dispelled from my mind. During the past twelve months ten papers were read, the greater portion of which, being the production of tyros in the science, exhibit, at least, an energy on their part to promote Entomology to the position for which this Branch Society was instituted. Affiliated with the Entomological Society of Ontario, whose headquarters are at London, Ontario, we receive the same benefits of membership, &c., as our western brethren composing the parent body. Our by-laws are suitably framed to meet the general work of the Branch, and the only future requisite will be a mere effort to prevent our Financial Secretary from grumbling. By so doing, and with punctual attendance, we will be enabled to continue our regular monthly meetings, and have greater pleasure when we meet mutually together in the pursuit of our favourite study. Bear in mind, however, that during the next year our cabinet must be attended to—it will be necessary that it should contain at least the nucleus of a general local collection, presenting a fair number of specimens of the several Orders of Insects. I maintain that if we possess a good classified collection of native insects it would be a great inducement for young beginners to join us. Books on Entomology are generally expensive, and only a few can be consulted studiously in regard to the noxious and beneficial insects of this country. Valuable Entomological literature issues annually from the pens of co-labourers in the United States; the greater portion of these are in the form of State Agricultural Reports, which seldom come to our hands. Our branch is simply in the chrysalis state, and in consequence of the metamorphoses not being complete, we are unable at present to produce some tangible matter in exchange; but I trust the day is not distant when some of our young beginners will be proud of their productions—as worthy of being read by the old heads in the science. However, I have thought that, from time to time, duplicate papers on Entomology may be received by the Parent Society in exchange for THE CANADIAN ENTOMOLOGIST. These extra papers could be perused, and doubtless be of service to members of our branch, and the parent might, if it possesses such material, liberally share them between the three branches of its Society.

The Report of the Council informs you of the labour, &c., performed by members during the year. Possibly these labours will stand a fair criticism as emanating from a Society only in its second year, and the actual working members but young beginners. Old students should always bear leniently towards the tyro, especially when the latter seems anxious for information. He must be encouraged in this way. The low temperature which we experience in this latitude, during the greater portion of the year, may produce a kind of carelessness or lethargy in the young student of Entomology. This he should endeavour to avoid, and he can do so by devoting his leisure winter hours to the arrangement of his cabinet—that is to say, in reading, naming and classifying his specimens. He who admires the beauty and appreciates the value of Entomology will, with the return of lovely spring, refreshen his faculties as the objects of his research appear again before him.

We require more knowledge in connection with the distribution of insects, especially in regard to the Lepidoptera of Europe; I mean such species as are recorded as occurring in this portion of North America. Butterflies which are found distributed at this day throughout a great extent of this country, are recorded by the best of naturalists as having followed man from the Old World. Such species should be fully defined in order to prevent additional synonyma. "There is so great a similarity between our insect fauna and that of Southern Europe, that a knowledge of their species is often of great advantage in determining our own." The late Professor Agassiz states in his work on Lake Superior, that *Vanessa Antiopa*, "The Camberwell Beauty" of England, is one of these. That a few of the Diurnals are common to both continents I have no doubt, but in which of them did the species obtain their origin, or what is now termed their metropolis? My respected and talented friend Scudder, of Boston, in a late memoir on the genus *Pamphila*, says in his comments on *P. Manitoba*—a new but

wide-spread species on this continent—that "the richness of this genus in America, and its extreme poverty in the Old World (where only a single species is known), lead to the presumption that the genus had its origin in our own country, and that temperate North America is its proper metropolis." I have examined and compared specimens of *Pamphila comma* of Europe, and *P. Manitoba* of America, and cannot discern the slightest difference in their forms and markings. Even in the forms of abdominal appendages there is but slight differences in these two forms. It may be further stated, as it has been by others, that *P. comma* was introduced into this country from Europe. Moreover, like other introduced species, it had perhaps to feed on a different food plant to that on which it fed in the Old World. This, in my opinion, produces at least external changes, and in connection with the wide spread of the form, we must as a natural result have varieties, the latter unfortunately being evidently considered species. The HESPERIDÆ intermix to some degree, and it is extremely difficult to trace the true form from its variety. Mr. Scudder is the chief authority on the HESPERIDÆ of the country, having made extensive research among this difficult class of butterflies; therefore he has greater facilities to prove differences between them, but I cannot look upon these two butterflies and discover the slightest deviation more than we find in the examination of a number of specimens of any particular species. A well-known European and American butterfly, *Vanessa Antiopa*, has a wide range and undoubtedly holds its metropolis on this continent. The colour of the wing-margins of this species has changed since its introduction into temperate America. All of us have seen the change which numbers of *Pieris rapæ* has gone through since its introduction into Canada, but after all it is nothing but the rape butterfly of Europe, slightly altered by change of food and climate, and it is just possible, by like influences, that the abdominal appendages of *P. rapæ* may in twenty years hence show differences in wide-spread varieties, as we have now shown to us in *Pamphila comma* of Europe, and *P. Manitoba* of Scudder. When *Pieris rapæ* came to us at Quebec, it changed and spread gradually, and although it lingers before the pressure of a parasite, yet it seems to hold against the enemy. This shows that there is something in this diversified climate favouring its spread which is southward and westward, and it is now a permanent insect of the United States. In these days there are so many ways by which insects are carried from place to place, that we cease to wonder when a strange species turns up in a locality wherein it was hitherto unknown.

It is a notorious fact, that almost all the insects which annoy our agriculturists and horticulturists came to us from the Old World. For instance, we have a saw-fly, which is found in our woodlands. It has lived there from time immemorial on wild gooseberries, and perhaps on the wild red currant, and we cannot find many instances of this species having attacked the domesticated gooseberry or currant to any extent. But the species introduced some twelve years ago from Europe has almost put a stop to the cultivation of the gooseberry and red currant throughout many parts of the United States and Canada. We have also a native onion-fly (*Ortalis arcuata*), which, although parasitic on the onion, does not appear to affect the crop generally, but the imported onion-fly (*Anthomyia ceparum*), an allied species, is a terrible pest to the onion-growers throughout the extent of the Dominion. Indeed, we have had an alarming number of insect foes imported into this country from the other side of the Atlantic. Another species of the latter genus has been destroying the cabbage in the neighbourhood of this city. This *Anthomyia* was also imported from Europe. The question may be asked, did these insects follow the introduction of certain plants from the same quarter? If *Antiopa* followed man to this country, its migration benefits the species, as the willows on which it feeds are far more abundant here than in Europe; but man has been instrumental in carrying noxious plants as well as insects, there being now distributed in America upwards of TWO HUNDRED AND THIRTY-THREE distinct species of plants from the Old World, all of which have run wild. It would seem that the climate of America is very conducive to the acclimatization and extension of European species. No doubt a number of North American insects have been, and will be from time to time, introduced into the Old World, but it appears that those already detected as coming from this country have not spread and become common there. These statements are made on the authority of British Entomologists and from the pen of C. V. Riley, the State Entomologist of Missouri, U.S., who accounts for the cause as follows:—"Since, then, it can be demonstrated by hard dry facts that American plants and insects do not become naturalized in the Old World with anything like the facility with which the plants and insects of the Old World are every day being naturalized in

America, there must be some cause or other for this singular state of things. What is that cause? It is, as we believe, a simple fact, which is pretty generally recognized now as true by modern naturalists, viz., that the plants and animals of America belong as a general rule to an old-fashioned creation, not so highly improved and developed as the more modernized creation which exists in Europe. In other words, although this is popularly known as the New World, it is in reality a much older world than that which we are accustomed to call the Old World. Consequently our plants and animals can no more stand their ground against European competitors imported from abroad, than the Red Indian has been able to stand his ground against the white Caucasian race. On the other hand, if by chance an American plant or an American animal finds its way into Europe, it can, as a general rule, no more stand its ground there against its European competitors than a colony of Red Indians could stand their ground in England, even if you gave them a whole county of land and an ample stock, tools and provisions to begin with. For throughout animated nature, as has been conclusively shown by Charles Darwin, there is a continual struggle for existence, the stronger and more favourably organized species overpowering and starving out from time to time their less vigorous and less favourably organized competitors. Hence it is as hopeless a task for a poor puny old-fashioned American bug to contend against a strong, energetic, highly developed European bug as it would be for a fleet of old-fashioned wooden ships to fight against a fleet of our modern iron-clads." Mr. Riley gives also another and perhaps the correct reason why the insects which are imported into this country multiply at a prodigious rate. . . It is that "whenever an injurious insect is introduced in our midst, as a general rule the particular parasite or parasites which kept it in check abroad are not introduced with it. Now, if what I have read are facts, and doubtless they are, it is evident that the Colorado Potato Beetle, even if it does reach any part of the Old World, will have a poor chance of extension, believing that that law which governs the struggle for existence will be brought to bear against it, as has been the case in regard to other introduced species from this country."

A few years hence will prove these statements—that is to say, if the Colorado Potato Beetle reaches Europe within that time. It was introduced into Canada in 1869; during the latter year it was first noticed near Point Edward, at the extreme south of Lake Huron, and opposite Detroit, near Windsor, at the south-western corner of St. Clair. Since then it has been making its way towards the Province of Quebec. It was last noticed on the eastern confines of Ontario, so that at its present rate of spreading, we may expect this most destructive insect in our neighbourhood at no distant day.

I now beg to return thanks for your attention to the welfare of the Branch, as well as for the kindness shown me while presiding over you since it was formed.

WILLIAM COUPER,
Montreal.

ADDRESS OF THE INCOMING PRESIDENT OF THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

GENTLEMEN,—On assuming the duties of the office which you have so kindly conferred upon me, I wish to make a few remarks in the hope and with the object of furthering the interests of our Society, and stimulating us in the study of our science. The excellent address given at our last meeting by our retiring President was, in the parts relating to our Society, mainly retrospective in character, as befitted the occasion; but as we are now beginning another year's studies, I intend my remarks to be prospective—looking forward to what we may do during the present season, and endeavouring to point out some things which, I think, will help us on individually, and advance our studies as a whole.

To the statement that Entomology is a pleasing, nay, a fascinating pursuit, you will all readily agree. That it is also the means of healthful and innocent recreation, is also a truth to which your assent will be cordially given. And it is not only a pleasing study and a healthful recreation, but also a *science* requiring close and deep research in order to properly understand its secrets. I believe that as time goes on, and the study of insects is more and more pursued in a philosophical manner, it will be of great value in solving many of the problems relating to animal life, which now claim the attention of naturalists. It may even aid in elucidating some of the mysteries of past conditions of life in this planet, and supply data

relative to the phenomena of species and varieties, which may be applied to the solution of this question with regard to higher forms of life. I think that the importance of our science in these respects is not sufficiently recognized by us ; that we are content with merely getting our insects properly named, and rejoicing over a rare or a new species, while the removing of the insect races, their habits, instincts and co-relations, which might help in solving the questions before referred to, are passed over too carelessly. Now, though from our position in life we can devote to Entomology only leisure time, I think we ought to try and dive a little beneath the surface, and study the science, so far as our opportunities go, in a more thorough manner. Though we have not the time, nor the privilege of access to larger collections and libraries, which make us almost envy the position of many Entomologists in the United States, yet we may do something in our small way if we only set to work. The modern sciences have all been built up to their present high perfection on the inductive principle. Observation and experience have been the basis for advancement and theory, in contradistinction to the old system of theory first and observation afterwards. This inductive principle is the only solid foundation on which true knowledge can rest, and it is as applicable to Entomology as to any other science. In its economic aspect, or the study of insects and their hurtful or beneficial influence on cultivation, observation is of the first importance. And in the strictly scientific application of the pursuit, as in the study of species and varieties, the distribution of species, &c., all acquisitions to our knowledge must come from close and patient observation.

Now, I think we ought during the present season to pay more attention than we have hitherto done to the daily lives of our insect friends. A little thing, trifling though it may seem at the time, may give us a clue to something of greater importance, and the smallest insight into the habits, instincts or organization of an insect, when added to the observations of others, may lead at some future time to great results. Nothing is really little in the kingdom of nature ; everything is under the wise and eternal laws of the Creator, and works for the end He designed, so that the smallest insect is worthy of our study, and may aid us in understanding something of the order, wisdom and skill which He has exerted in the creation and adaptation of the parts composing the wonderful system of life in which we find ourselves. Let us look then after little things, for as Smiles well observes, " Human knowledge itself is but an accumulation of little facts, made by successive generations of men ; the little bits of knowledge and experience, carefully treasured up, growing at length into a mighty pyramid. Though many of these facts and observations may have seemed in the first instance to have but slight significance, they are all found to have their eventual uses, and to fit into their proper places. Indeed the close observation of little things is the secret of success in business, in art, in science, and in every pursuit in life."

I hope you will not think I am digressing, but I like to take and wish to give you an elevated ideal of our favourite study. If we consider any object we have in view a worthy and valuable one, we shall be the more likely to pursue it with assiduity and zeal ; and while we regard Entomology as a pleasant recreation, let us not forget that it is a science bearing not only on the great interests of agriculture, but also, in conjunction with the other departments of Natural History, on questions at present causing agitation and discussion among the leading scientific men of the day.

Let our note-books then be kept ready, and whatever new thing we meet with during this year, in the life of our insect friends, be duly recorded. We shall at least be adding our little stone to build up the great Entomological pyramid.

Another thought which I wish to bring before you is, the advisability of extending our fields of operations. One of our principal objects is to learn something about the insects of the Island of Montreal. We cannot expect to learn *all* about them, or even to make a complete catalogue of their names, for some time to come, but we ought to remember that there are other orders represented here besides the Lepidoptera and Coleoptera. If we wish our Society to be symmetrical and well developed, we must study the other orders, otherwise we shall be a kind of monstrosity—an Entomological Society with a fair knowledge of the butterflies, moths and beetles of the Island, but utterly ignorant of its remaining and not less interesting insect inhabitants. To make a beginning, let us take all kinds, and then the possession of the specimens will incite us to find out their names and history. And if there was a good collection in the hands of the Society, say of Hymenoptera, I have no doubt, but that some member would be courageous enough to undertake the work and the pleasure of studying them up.

We are not doing ourselves justice in neglecting these other orders to such a degree, and I am sure (if you will allow me to venture on a joke) that if the insects themselves could only estimate our labours at their true value, we should have them protesting against being ignored in such a summary way. Besides, these orders are really of equal value with those we already study. Packard places the Hymenoptera at the head of the insect tribes, and I believe with good reason. They outnumber many of the other divisions, and far surpass all of them in the degree of perfection of their instincts. Many of the Neuroptera I consider not inferior to the Lepidoptera in beauty, and their more humble compatriots, the Hemiptera and Orthoptera, though more sober in their tints, and fewer in number, enjoy the unenviable reputation of being more injurious to cultivated plants than perhaps any of the others. Here then is a field still unexplored by us, full of objects of beauty and interest. Let us enter, and while extending our own knowledge, do our best to make the list of our Montreal insects complete.

Apart from these general recommendations, I wish to mention one or two things which should particularly engage our attention. They are included under the first recommendation I have made, namely, that of close and patient observation of insect life; but as they are of especial interest to us, I speak of them separately.

We all know that *Pieris rapæ* sometimes produces yellow males, and in fewer instances yellow females. Now, our worthy friend, Mr. Caulfield, has asserted that he fed certain larvæ of this species on mignonette, which larvæ became at last yellow imagines. The experiment is worthy of another trial, and if we each tried, and the assertion of Mr. Caulfield turns out to be well founded, the fact would go a long way to establish the theory that the colours of insects are influenced by the food plants of the larvæ.

Another fact we might be able to give to Entomological science this year. The Caterpillar of *Samia Columbia* has not been described, and I should like some member of our Society to have the honour of first describing it. The food plant is supposed to be a shrub growing in marshy ground—*Rhodora Canadensis* ; but I feel certain that like its cousins, Polyphemeus and Cecropia, the larva feeds on several distinct species of plants. I once had the larva, and know that it somewhat resembles that of Cecropia. having red tubercles on the fore part of the body, but different in number and situation to those of the latter. I give this as a hint to aid you in your researches. There is still another point which ought to interest us this year. I expect that the Potato Beetle will make its appearance in our midst before the close of the season. We must be on the look-out, and have the credit of giving the public the first intimation of its coming. If it does not come this year, it surely will next, for the Ottawa papers have announced its arrival in that neighbourhood, only one hundred and twenty miles away.

There are several very interesting topics now being discussed among Entomologists in America, in which discussion we should try to have a share. The question of the dimorphism of insects,—the question of the Graptas, in which Mr. Edwards is so deeply engaged—the question of different forms of larva in the same species, as that of Datana Ministra—the question of the distinguishing of the sexes in the larva state—and many others, are very interesting in themselves, and perhaps intimate to us (though without proving Darwinism, in which I, for one, do not believe), the way in which new species are elaborated in the grand processes of nature.

Before closing my remarks, I would like to glance at the state of our science in Canada and the United States. It is advancing in every respect. In Canada it is still in what we might call the *practical* stage—the knowledge we have is being applied, as far as possible, to the promotion of agricultural interests. But in this respect there is a great advance beyond what Canadian Entomology was a few years ago The annual reports issued by our Society for the Ontario Government are of very great value to the people, and tend, though practical in themselves, to the growth of the more philosophical departments of the science. Our journal has grown from the little four page serial of a few years ago, to be an excellent periodical, and maintains a high reputation everywhere. It is to be regretted that the diligent pursuit of business, so necessary among young people like Canadians, should interfere so much with the pursuit of Natural History among them. Our fellow-entomologists in Canada can only give their leisure to the study, and this alone prevents them from taking an equal position with those of the United States. I very much wish to see some Canadian gentleman of talent and leisure take up the study, or some Professor of our numerous colleges.

In the United States, the entomologists are doing good work in their different departments, and while the task of naming and describing is being rapidly prosecuted, some of them have leisure even to aim at changing the arrangement and nomenclature of the science. All honour to them for their industry and zeal, though some of their projects are too revolutionary, even for the present changeful age. Still I believe that even Mr. Scudder's system will be adopted at last, though, perhaps, very much modified in form. The great objectiou to it is the unearthing and bringing to the front of the names and classification of Hubner and other old authors who have been unnoticed if not forgotten for many years, and supplanting with these names those with which we have been familiar, and which have been given by entomologists who may be called the fathers of the science in America. The "law of priority," as it is called, is being enforced to its utmost limit—too far, in my estimation—and the result must be a discussion which will bring about a settlement of the question. Some years will doubtless pass before this end is gained ; in the meantime I like to keep to the old familiar names, which seem to me like the names of old friends.

In the department of Physiological Entomology, Dr. Packard is carrying on investigations of great interest, into the nervous system of insects, which must result in the real advancement of the science, and a great increase in our knowledge of a most wonderful and attractive subject.

And now, gentlemen, I thank you for the honour you have done me in electing me your President. I hope and believe that this year will be a prosperous one in our history, and that we shall reap both mental and physical benefit from our studies.

G. J. Bowles,
Montreal.

MEETINGS OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

According to previous announcement, the first meeting of this Club was held in the rooms of the Detroit Scientific Association, on the 10th of August, 1875, at 2.30 p.m., Dr. J. L. Leconte, President, in the chair ; Prof. C. V. Riley, Secrerary. The attendance was large, including S. H. Scudder, Esq., Cambridge, Mass., Vice-President, and Messrs. A, R. Grote, Buffalo, N.Y. ; W. Saunders, London, Ont. ; B. P. Mann and E. P. Austin, of Cambridge, Mass. ; Prof. E. S. Morse, Salem, Mass.; J. A. Lintner, Albany, N.Y. ; E. A. Schwarz, H. G. Hubbard, and B. Walker, of Detroit ; Dr. A. E. Dalrymple and Dr. J. G. Morris, Baltimore, Md. ; Prof. A. J. Cook, Lansing, Mich. ; Dr. Hoy, Racine, Wisconsin ; Clinton Roosevelt and Geo. Dimmock, Springfield, Mass. ; B. D. Sanders, J. C. Holmes, and Wm. Provis, Detroit ; J. T. Ison, Cleveland, Ohio; and others.

President Leconte, in a few opening remarks, stated the objects had in view in the formation of this Club. They were chiefly to cultivate closer personal relations among those interested in Entomological pursuits, many of whom were widely separated by distance, to exchange views and record observations, and to exhibit specimens of interest. He hoped that the meetings would not only be fruitful in these respects, but that, seeing the importance of Entomology in its relation to agriculture, some good to the country might flow from the deliberations.

Mr. Wm. Saunders mentioned the fact of the unusual scarcity of insects of the Saw-fly family (*Tenthredinidæ*) throughout western Ontario, especially those destructive to fruit, naming the Gooseberry Saw-fly (*Nematus ventricosus*) and the Pear Tree Slug (*Selandria cerasi*). Both these insects, although enormously abundant and destructive in 1874, had been quite scarce in 1875. He called for suggestions as to the cause, his own impression being hat this diminution had been caused by the severity of the late winter and spring,

Prof. Cook, of Lansing, Mich., had not observed any remarkable scarcity of these species in his neighbourhood.

Prof. Riley had remarked their almost entire absence in some localities, and their comparative abundance in others.

Mr. A. R. Grote exhibited specimens of *Agrotis islandica* from the top of the White Mountains and from Labrador.

A lengthy discussion on nomenclature ensued, and was participated in by many of the members present, it being generally conceded that some action should be taken by the Club, looking to the adoption of some rules or suggestions which might guide the Entomologists of the country on this perplexing question. On motion, Messrs. Scudder, Riley and Saunders were appointed a committee to take the matter of nomenclature into consideration and present it at a future meeting in such form as to offer opportunity for more definite discussion.

Mr. Scudder spoke favourably of *Psyche*, the organ of the Cambridge Entomological Club, and urged that members subscribe for it on account of its excellent bibliographical record.

Mr. Mann called attention to the difficulty of getting hold of State Reports, and thought there should be some system adopted by which these Reports could be placed on sale, so that Entomologists who desired to do so might purchase them.

Mr. Saunders thought that if some plan could be devised whereby the valuable facts and suggestions contained in these various Reports could be brought together, condensed into one volume, and made available to agriculturists as well as entomologists, that much good would result from it.

The President suggested that such a work might well be done by the general government, and would be much more valuable than the volume it now sends out.

On motion, it was resolved that this Club request the American Association for the Advancement of Science to take such action as seems best calculated to secure the placing of State Reports upon scientific subjects in the library of the Association. The Secretary was instructed to bring this subject before the Association.

Dr. Morris referred to the scarcity of Sphingidae about Baltimore during the present season, an experience which was corroborated by other members present. Mr. Austin had found all insects unusually scarce about the White Mountains, where he had been collecting for the past two years. Mr. Riley thought the very severe and late winter and the unusually rainy summer in part explained the fact.

Mr. Scudder offered some remarks on the great abundance of the Army Worm (*Leucania unipuncta*) in portions of Massachusetts, as an exception to the general rule of scarcity of insect life; he had made a calculation from the number counted in a square foot, that in a field near Cambridge there must have been as many as two million worms to the acre. Other members offered similar experience in reference to this species. Mr. Riley stated that the Army Worm generally abounds during a very wet summer following a very dry year.

Mr. Lintner referred to the great scarcity of *Orgyia leucostigma* as in striking contrast to its abundance last year in Albany.

The election of officers then took place, resulting in the re-election of Dr. John L. Leconte as President, Samuel H. Scudder, Vice-President, and C. V. Riley, Secretary.

Mr. Riley read a paper on "Locusts as Food," in which he gave his own experience in cooking and eating them. On one occasion he ate nothing else for a whole day. He found them to have an agreeable nutty flavour, and especially recommended them deprived of their legs and wing cases, and fried in butter, and also spoke very highly of a soup made from them. He referred to John the Baptist, who had often been pitied for the scantiness of his fare, locusts and wild honey; Mr. Riley thought he had been well provided for. The writer regarded it as absurd that parties should actually die of starvation, as some had done in the districts where this locust plague had prevailed, while surrounded by such an abundance of nutritious and palatable food.

The meeting then adjourned, subject to the call of the President.

On Tuesday evening, the Cambridge Entomological Club held a meeting, when all interested in Entomology were invited to be present. W. Saunders, of London, Ont., was called to the chair. After the usual routine business had been disposed of, Mr. George Dimmock read a paper on the recent excursion of the Cambridge Club to the White Mountains, where the members had spent some two weeks in collecting. The experiences related were of a very interesting character, showing that the party, besides accomplishing much useful work, had thoroughly enjoyed their trip. Mr. Austin, who had been one of the party, ex-

hibited a large collection of insects made during the past two years among the White Mountains, embracing many very interesting species, and offered some remarks on their habits.

Messrs. Cook, Lintner, Morris and Riley were elected members of the Club.

Mr. Grote presented some instructive facts in relation to the identity of some of the White Mountain moths with those of Labrador. Mr. Riley inquired whether many *Caloptenus* had been found on Mount Washington, and expressed an opinion that a race of *spretus* had been found there.

Mr. Saunders inquired of the Michigan friends whether *Pieris rapæ* had been found in the State. Prof. Cook stated that it had not yet appeared in Michigan; he remarked that *protodice* was much more numerous than *oleracea*. Mr. Riley stated that *protodice* was most abundant throughout Illinois and Missouri. Mr. Ison, of Cleveland, stated that *rapæ* appeared in his neighbourhood for the first time last spring; at first it was found along the lake shore, but before the season closed it was abundant throughout the greater part of the district over which his observation had extended. Mr. Ison said that with them the larva seemed to prefer mignonette to cabbage. In reply to a question as to the correctness of the views advanced by some Entomologists in regard to the colour of the imago being affected by this food plant, Mr Lintner said that he had, from among 500 or 600 specimens fed on cabbage, found a number of the yellow variety. Mr. Riley stated that the larva of *protodice* was also partial to mignonette.

Danais archippus formed the next topic of discussion. Mr. Cook had found the larva this season peculiarly infested by several parasites. Mr. Riley had seen Tachina flies bred from *archippus*. Mr. Saunders had reared, on one occasion, a large number of small Hymenopterous parasites from a chrysalis. He also asked the members if any explanation could be given of the reason why this species assembled occasionally in immense swarms and migrated thus from place to place, and referred to instances of such swarming. Mr. Ison referred to an immense swarm which passed over Cleveland three years ago. In this instance it appeared as if they had crossed the lake from Canada; they were seen in immense numbers for three or four days. *Archippus* was said to occur in Australia, where it also occasionally swarms.

References were made by Mr. Grote to several rare captures of Lepidoptera in the vicinity of Buffalo. Among others he had taken *Thecla ocellifera*, which is also found in the West Indies. Mr. Saunders stated that he had again reared a specimen of *Thecla strigosa* from thorn, and referred to the capture of specimens of *P. thoas* and *P. marcellus* at North Ridge, Ont., by Mr. F. C. Lowe, of Dunnville. Mr. Cook said that *thoas* had been found this year at Lansing, that it occurred there to his knowledge some three years ago, and that last season it was quite common, the larva feeding on prickly ash. Mr. Riley stated that the larvæ of *philenor* feed on a creeping plant very closely allied to Aristolochia. Mr. Ison has found *philenor* scarce about Cleveland during the last five or six years, but *marcellus* rather common; the larva of the latter feeds on pawpaw. One of the Detroit members remarked that there were pawpaw bushes growing within a few miles of Detroit.

A discussion on sugaring for Noctuæ was next in order. Mr. Ison reported excellent success with this method at Cleveland; he preferred adding a little rum to the usual mixture of beer and molasses or coarse sugar. Mr. Lintner greatly interested the members in relating his wonderful success in sugaring. He produced a tabulated list of Noctuidæ captured or observed at sugar at Schenectady, N. Y., commencing with July 7th, giving the results of sixteen evenings in that month, and four evenings in August.

Seventy-eight species of Noctuæ are recorded, and opposite each species observed or collected is placed a check in a column bearing the day of the month at its head. Four species were observed on each evening, viz.:—*Hadena arctica*, *Hydroecia sera*, *Homopyralis tactus* and *Asopia costalis*. Of the first two, hundreds could have been collected on a single evening. *Hadena lignicolor* was unobserved on only one evening; *Erastria carneola* on only two evenings; *Catocala ultronia* and *Hadena devastator* on only three evenings.

The following species were common:—*A. herbida*, *A. haruspica*, *A. plecta*, *Orthodes infirma*, *Pseudothyatira expultrix*, *Hydroecia nictitans*, *Amphipyra pyramidoides* and *Erastria nigritula*. Of *Catocala ultronia* about *seventy* examples in fine condition were captured; of *Catocala nuptala*, of which not a single example had ever before been taken by Mr. L., thirty-six were collected; and of *Catocala parta* sixteen examples had been secured, all in perfect condition. Specimens of *Catocala Meskei*, *C. serena*, *C. Briseis*, *C. Clintonii*, *C. polygona* and *C. similis* had also been obtained.

Mr. L. has become quite enthusiastic over the success which he has met thus far, in the number of rare species collected, and particularly in the perfect condition in which the larger portion of them are obtained. It is his purpose to continue his collecting in this method, and also the tabulation of the results. The table, when completed at the end of the season, will probably be published in the New York State Museum Report. We are sure that it will prove a valuable contribution to that part of the natural history of our moths which relates to the number and duration of their several broods.

Mr. Mann exhibited specimens of the wood of *Agave Americanum*, which, when cut of the proper thickness, may be used as a substitute for cork. This wood is remarkably light and porous, and pins may with great ease be firmly pushed into its substance. It grows in Brazil, and can be obtained from Mr. Mann at a lower price than cork. In proof of the suitability of this material for the purpose named, Mr. Mann stated that Wallace preserved all his specimens collected in the East Indies in boxes made with pieces of this wood pinned together with thorns.

At a late hour this most enjoyable meeting was brought to a close.

On Thursday afternoon a large proportion of the members of the Club joined in an excursion to some good collecting grounds in the neighbourhood of Fort Wayne, the party being under the direction of Mr. Hubbard, of Detroit. A very pleasant and profitable time was thus spent, and many interesting specimens captured. In addition to the advantage enjoyed of closer social intercourse between the "brethren of the net," this occasion afforded an opportunity for the mutual exchange of practical ideas in regard to collecting insects which no in-door meeting could have afforded. It seemed as if every member had *some* original idea of his own either in reference to capturing or carrying specimens, the advantages of which were freely urged and as freely discussed with much profit. After thoroughly enjoying themselves for several hours, the members returned at nightfall well satisfied with the afternoon's sport.

On Friday morning a second meeting of the Entomological Club was held at the rooms of the Detroit Scientific Association. In the absence of the President, Mr. Lintner was called to the chair.

The Committee on Nomenclature reported as follows :—

"The Committee appointed at the last meeting of the Entomological Club to consider whether any immediate action is advisable on the part of the Club to aid in establishing uniformity in zoological nomenclature, finding that the Committee of the General Association intends to report during the present session, and deeming it best to await this Report before making any definite proposition, would at the present time recommend that the Club appoint a committee of five to prepare and present to the Club at its next annual meeting a compendium of the views of the leading Entomologists of the country upon points which, in their judgment, require elucidation, and also to present a series of resolutions touching such points, in order that intelligent discussion may be had upon them, and some general agreement, if possible, arrived at.

(Signed) "Samuel H. Scudder.
"C. V. Riley.
"Wm. Saunders."

On motion, the Report was adopted, and the appointment of the Committee left with the President, who subsequently nominated the following gentlemen :—Messrs. Scudder, Saunders, Grote, Riley and Leconte.

An interesting discussion then took place in reference to the various methods of pronunciation followed by Entomologists when speaking of insect names, which culminated in the following resolution, which was carried unanimously :

"Resolved, That in view of the desirability of securing uniformity among Entomologists in the pronunciation of the names of insects, Mr. O. S. Westcott, of Chicago, be requested to prepare such an accentuated list for publication in the Canadian Entomologist."

Mr. Westcott very kindly promised to give his attention to this matter at an early date. We shall hail the advent of this list with much satisfaction ; it is a work greatly needed, and coming from the hands of one who is in every way well fitted to do it justice, we feel sure that it will command general assent.

The next subject of discussion was on certain offensive names which have been proposed for insects, in which most of the members took part. The following resolution was unanimously adopted :—

"Resolved, That in view of the fact that certain names have of late been proposed for insects which are offensive and unwarrantable, that the Committee on Nomenclature be requested to present at the meeting next year a list of such names as should be ignored, so that the Club may take action in reference to them."

Some explanations were then offered in regard to a valuable discovery lately made by Mr. George Dimmock, of Springfield, Mass., of a ready method of removing the scales from the wings of Lepidopterous insects, so as to display the vein structure. Mr. Dimmock had kindly shown the admirable working of his process to a number of Entomologists at his room the evening previous, when all present were struck with the great practical value of the discovery. After full explanations to those present who had not seen the working of the process, it was resolved, "That the thanks of the members of the Entomological Club be given to Mr. Dimmock for his valuable discovery in reference to a ready method of denuding the wings of insects."

This process of Mr. Dimmock's formed the subject of a paper read before the American Association, and which will be published, we believe, in an early number of *Psyche*. It may thus be briefly explained: All the materials necessary are a little alcohol, a saturated aqueous solution of chloride of lime, a phial of pure muriatic acid and another of sulphuric acid The wings are first moistened with alcohol, then transferred to the solution of chloride of lime, to which a little of the sulphuric acid has been added. After immersion for a few moments, the colouring matter of the scales rapidly disappears. This result may be hastened by taking the wings out of the chloride of lime solution and immersing for a moment in the muriatic acid, diluted with twice its weight of water, and then returning them again to the former solution. This alternation may be repeated as often as required. By this means any quantity of wings of Lepidoptera may be safely and entirely denuded with little or no trouble.

The denuded wings were neatly mounted by Mr. Dimmock on white cards, to which they had been gummed. An interesting collection, illustrating the nerve structure of many of the genera of moths, was exhibited by him, to the great gratification of all present.

In the compilation of these memoranda in regard to the meetings of the Entomological Club, we are greatly indebted to the Secretary, Prof. C. V. Riley, who very kindly placed his notes at our disposal; also to Mr. B. P. Mann, of Cambridge, who did us similar service.

During the course of the Sessions of the Association, a valuable and practical paper was read by Dr. J. L. Leconte, retiring President of the Association, on various methods of subduing insects injurious to agriculture. This question being one of immense importance to the country generally, and especially to the agriculturist, elicited much discussion, and finally it was resolved to memorialize the Senate and House of Representatives of the United States in reference to the carrying out of some of the suggestions made by the learned author of this paper. We append a copy of the paper, as well as one of the memorial, all of which we commend to the careful consideration of our readers.

METHODS OF SUBDUING INSECTS INJURIOUS TO AGRICULTURE.

BY JOHN L. LECONTE, M.D., PHILADELPHIA.

(*Read before the American Association for the Advancement of Science, at Detroit, Aug. 10th.*)

In accordance with the predictions made at the time of its first appearance in the immediate Mississippi Valley, the Colorado Potato Beetle continues to extend its area of distribution. It has during the last and present seasons reached the Atlantic coast of the Middle States, and is preparing an invasion in mass of the maritime parts of New England, which will soon be overrun with the same ease with which it has conquered the West-

ern and Middle States. Meanwhile the farmers are anxiously inquiring for means of destroying the invader. Materials destructive to the insects, and said not to be injurious to the plant or the soil, have been recommended almost without number; but, with the exception of Paris green, they have either been very insufficiently tried or found inoperative. That compound of arsenic and copper, therefore, remains naturally the favourite, notwithstanding its dangerous qualities and the possible deleterious effect it may produce on the fields after long use.

Entomologists and other scientific men are often asked: "Why do you not give us another remedy against this destructive insect? Are you baffled, with all your boasted progress in learning, by the invasion of a wretched little bug?" No, my friends, we are not baffled by the wretched little bug; but in our endeavours to teach you how to dispose of it in such a manner as to protect your crops, we are embarassed by your own failure to grasp the magnitude of the problem which you have set us to solve. Had you indeed comprehended the warnings given by my lamented friend B. D. Walsh, on the first injurious appearance of the insect, and since repeated by many Entomologists, you would have insisted several years ago that the subject should be investigated with a power of inquiry proportioned to its importance, and you would have received such information as might, with proper and well-directed industry on your part, have prevented much loss.

However, I do not wish to speak of the past; it is gone, and its errors cannot be undone. Let us rather inquire what shall be done in the future.

The first thing, then, is to cease calling upon science for a remedy, when science and empiricism have probably already given you many remedies, concerning the application of which I will have a word to say by-and-by. Science can help you and will help you only when you have begun to help yourselves. How, then, can we begin to help ourselves? I hear you ask. First, then, there should be a Scientific Commission, selected by competent scientific authority for their merit and not for their political influence. Politicians have had too much control over our agricultural interests, as you all have reason to remember with regret. This Commission should be sufficiently large to subdivide the subjects committed to them in such manner as to thoroughly investigate the habits and times of appearance in different districts of the great agricultural pests, the effect upon them of all the cheaper materials which have been or may be judiciously suggested as destroying agents, and the proper times and manner of applying them. The members of the Commission should also receive sufficient compensation to warrant them in giving as much time and labour to this investigation as may be required, even to the temporary abandonment, if necessary, of their other scientific or secular pursuits. No such task can be properly performed and completed by the solitary labours of State Entomologists underpaid and overburdened with work. Only by association of several such careful observers and investigators can a worthy, useful result be obtained for the suppression of several of the most formidable pests.

2. This information being procured, should be tabulated as far as possible, or at least reduced to a compact form for easy reference, and widely published iu newspapers and also in pamphlet form.

3. By the distribution of this information and by appeals through the newspapers and agricultural journals, as well as by addresses at meetings of farmers and others interested in agriculture, it must be impressed upon the public mind that all individual efforts for the suppression of these pests are frequently futile. Only combined and consentaneous action over large tracts of country will be effective.

Now, while I am prepared to believe that when these facts are made known to the farmers they will immediately see the importance of the suggestion for unanimous and simultaneous advance upon the enemy, yet without legislative aid it will be quite impossible to secure the organization requisite for an effective onslaught. It will therefore be necessary for the citizens interested to command their representatives, either in State Legislatures or in National Congress, to prepare proper laws for the destruction of these pests at stated times, to be determined and recommended by the Scientific Commission. These laws will be not only cheerfully obeyed by every intelligent farmer, but I know that the farmers as a class will be glad to have such laws enacted and enforced with penalties for their neglect. Those disposed to help themselves and each other can only thus be protected against an ignorant and indolent neighbour, whose thriftlessness would other

wise make of his potato patch, his cotton field or his plum orchard a nuisance nursery from which no industry could protect the surrounding farms.

Thus, then, the organization necessary for a successful campaign against our insect enemies must be authoritatively demanded by you. Under less free forms of government the plan which I have suggested would probably have long ago been perfected by the rulers. Even the fear of the extension of the Colorado Potato Beetle to Europe has excited in several countries almost as much discussion and confusion of counsel as an apprehended revolution.

The fact is, that these incursions and ravages of hostile insects represent a condition of *war*. It is only by a *quasi*-military organization and appropriate weapons suited to the nature of the enemy that they can be conquered. Without recognition of this fact nothing can be done against them, and we must bow our heads and exclaim with the pious Mohammedan fatalist, "It is the will of God."

Three subjects yet remain to be considered—the materials to be used, the time of making the attack in force, and the weapons to be employed.

1. The materials may be either vegetable or mineral, or merely human labour intelligently and persistently applied. The latter is the only effective means of contending against some insects, but in all cases it is a necessary adjunct to the remedies used. These remedies are very numerous, and until a careful investigation is made of the large number already suggested, no proper indications can be given except that those least injurious to man should be preferred, even at greater cost of money and labour; and that those which kill the insect by contact with its body are likely to prove more effectual than those which destroy by poisoning its food. It may be here observed that the form of apparatus in these two cases must be quite different. In the latter, any contrivance which will sprinkle a fluid or dust a powder on the exposed or upper surface of the leaves will be sufficient; in the former, in which the poison kills by contact with the insect, it must be able to reach the enemy wherever sheltered.

2. The time of attack must naturally be when the enemy is least able to resist. To quote again from the excellent memoir of Motschulsky, "the most effective and at the same time the easiest mode of opposing the development of the locusts is the crushing out of the young broods when collected in swarms in the place where they are hatched. Consequently the most important thing is to know the nesting place of these destructive pests. In order to discover them and to point out the course to be pursued, * * it might be well to send skilful persons * * to make the necessary researches, and these, with the assistance of the local authorities, might seek out the places where the insects abound, and establish the necessary regulations for their destruction." (l. c. p. 228.) In the case of the cotton moth it is plain that the attack should be made upon the earliest broods, which are said to appear in the extreme southern part of the country, and from which the migratory swarms which travel northward are supposed to be developed; also, that the attack must be directed against the caterpillars rather than the perfect insects.

The Colorado Potato Beetle may also be attacked with greatest success in the larval state. The integuments are then soft, and the appetite more voracious, so that whether the poison by contact or the poison by food be used, it will have a more certain effect than upon the perfect insect, which is protected against the former by the hard chitinous surface, and against the latter by preoccupation in reproductive duties.

You will be prepared to admit the importance of the recommendation above made, that the times for making the attack should be directed by the Scientific Commission after full examination of the habits of the insects and the dates of their appearance in their various stages of development. These dates will vary in different districts, and without a carefully tabulated calendar of the necessary facts, no system of combined effort, such as I believe to be essential, can be planned.

The apparatus to be used must of course vary greatly with the habits of the insects to be attacked. In the case of the plum curculio, canvas frames propelled on a kind of wheelbarrow, with a ram to concuss the trunk of the tree, is probably the best instrument yet devised. The insect will fall into the net when the tree is struck, and may be easily destroyed when a sufficient mass has been collected. For the cotton moth and the potato beetle the apparatus for poisoning the leaves upon which they feed may be any simple sprinkler or dusting box, according as liquid or solid poison is employed. But for

direct application to the insect itself, we must use means by which a fine spray will be driven with force sufficient to envelop the whole plant, or the surface of the ground upon which the insects are assembled, in a mist of poisonous liquid. Such an instrument is the atomizer, which has the additional advantage over the sprinkler that it consumes less liquid. The first application of the atomizer for the destruction of insects was made by me several years ago; and in the *American Naturalist* for August, 1869, I published a short paper recommending its use with certain poisonous liquids for the disinfection and preservation of insect cabinets. I have seen its frequent use with great success.

When the question of locusts became of importance last year, and the Colorado potato beetle began to be very troublesome in the Atlantic States, I spoke with several commercial friends and others about the propriety of making atomizers of large size for the destruction of these pests. In consequence of delay in the measures they thought necessary to command the attention and security of a manufacturer, no progress has yet been made for introducing such a contrivance into general use. Meanwhile a small apparatus, consisting of an atomizer, a tank of fluid supported on the back, and a pair of bellows fixed at the side of the operator, has been independently introduced by a manufacturing establishment in Philadelphia, and I have been told is somewhat of a favourite. It will doubtless be useful to a limited extent, and is not patented, I believe.

For small arms, this or a somewhat larger and more complete instrument will answer, but in the war against insect pests in which I have endeavonred to interest you, we must have heavy ordnance as well as weapons for hand use. Large compound atomizer tubes, with five, ten, twenty, or, in fact, an indefinite number of orifices for producing the spray, can be made, connected with large tanks of fluid, and worked by a powerful current of air from a revolving fan, driven by man, horse or steam power, according to the size of the instrument. When of sufficiently large size, the machine can be mounted on wheels and transported wherever it would be required for use. Before such instruments as these an invading army of caterpillars, or even a recently hatched swarm of locusts, would be annihilated. A comparatively small number of men would be required to work a battery of this kind of field artillery, and it would be found immensely effective.

The organization recommended can be effected only by the strong appeal of the people where agricultural interests dominate, for proper instruction from the Government and proper protection by legislative power. We have game laws to protect our useful wild animals; thistle laws to guard against extension of noxious weeds. Why not have insect laws for destruction of agricultural pests?

Farmers of the West, are you willing to exert yourselves to procure this result? The prize is a rich one—it is no less than immunity from an annual destruction of property quadruple or sextuple that of the great Chicago conflagration.

Copy of Memorial.

To the Honourable the Senate and the House of Representatives of the United States.

The subscribers to this Memorial respectfully represent to your Honourable bodies:

That they recognize in the invasion of grasshoppers, or more properly locusts, which during the past season have reduced to starvation many thousands of the inhabitants of the Western States and Territories, and especially of Minnesota, Nebraska, and Kansas, a great national calamity, calling for more efficient measures than those now available to prevent a recurrence of similar disasters.

They have reason to believe, from the reiterated cautions given by men of science, that a more careful study of the habits, rapidity of extension, and injuries caused by the few species of insects most destructive to agriculture would lead to useful suggestions by which proper means can be devised for the repression of these pests.

The agricultural industries are shown by all statistics to be greater in importance and value than all the other interests of the nation combined.

The labour required for the full investigation of the complex problems involved in the protection against natural enemies of these vast interests can only be had by the employment of the best men of science, who are usually not found in the service of the Government, but who for a great national purpose would give their closest attention to any subject which might be committed to them.

Such objects as the locust, which has caused recently a destruction of food estimated at from $40,000,000 to $50,000,000 ; the Colorado potato-beetle, which, in accordance with the predictions of Entomologists of repute, has extended from the Rocky Mountains to the Atlantic, and has invaded the neighbouring Dominion ; the Chinche bug, so destructive to cereals in the Valley of the Mississippi ; the army worm and the cotton worms which destroy whole crops, certainly require the strongest measures that can be adopted by the Government for their suppression.

It was estimated by Mr. B. D. Walsh, that in 1861 the injury caused by insects in the State of Illinois alone amounted to $20,000,000. The destruction must be now much greater.

By the same authority it was stated that "the annual damage done by insects in the United States cannot be less than $300,000,000.

The appropriations made by a State, however liberal,must ever fail to procure such investigations as your memorialists pray for : the enemies are national, and must be dealt with by national authority, as much as an invading army of foreigners, hostile to our civilization. Unless repressed by intelligent means applied over its whole area of distribution, the insect, with its free powers of movement in its adult state, is not controlled.

Your Memorialists would be glad to believe that the information needed upon these most important subjects could be afforded by the Department of Agriculture. Unfortunately such is not the case, nor can it be until the Department is under scientific advice. There remain, therefore, but two modes of procuring for the Government and the people proper counsel for defence against agricultural pests.

The first is the reorganization of the Department upon a scientific basis, under the control of men whose learning and fitness for the position are acknowledged both abroad and at home. The second alternative is the appointment of a Commission of five persons, —to wit, three entomologists, one chemist, and one botanist, eminent in their respective branches of science—to be chosen by the Council of the National Academy of Science, and approved by the Secretary of the Treasury, with such salaries as your Honourable bodies would consider adequate for the responsible work required of them, and with such additional appropriation as might be needed for clerical assistance. The duty of this Commission would be to investigate the causes which affect injuriously agricultural interests, and to suggest the best means of diminishing the losses.

The results of such investigations should be embodied in brief Reports containing practical instructions and made accessible at a small price, or by personal education to every farmer in the country.

It is believed by your Memorialists that the granting of their prayer by the creation of such a Commission would do more for advancing Agriculture than can ever be expected from the Department, and be in the end most economical. If such a Commission were appointed for a definite term (say five or seven years), it would at the end of that time save in part, or perhaps wholly, the annual expenses of the Department of Agriculture, and would lessen greatly the destruction of agricultural products, by tending to the rapid extermination of all these great pests.

It could be safely promised that the work of such a Commission would be of equal value and dignity with that of other Scientific Commissions of the Government ; such as the Coast Survey, Geological Survey, Commission of Fisheries, and Signal Bureau, and would be as strictly practical as either.

And your Memorialists, as in duty bound, will ever pray, &c.

OUR DECEASED MEMBERS.

FRANCIS WALKER.

The sad intelligence of the death of that distinguished Entomologist, Francis Walker, of London, England, will, we know, bring grief to the hearts of all those who have been favoured with the acquaintance or correspondence of that genial-hearted man. His continued and disinterested kindness towards all those with whom he had to do has endeared him to many. Although we never had the pleasure of a personal acquaintance with the deceased, yet to ourselves personally, as well as to our Society, he has always been among the truest and kindest friends we have had, ever ready to do us any service in his power. His death leaves a void in our circle which it will be hard to fill. The following brief sketch of his career and his unceasing labours, written by one who knew him well, will be read with interest :

It has become my painful duty to record that Francis Walker, the most voluminous and most industrious writer on Entomology this country has ever produced, expired at his residence, Elm Hall, Wanstead, on the 5th of October, 1874, sincerely lamented by all who enjoyed the pleasure and advantage of his friendship. He was the seventh son, and the tenth and youngest child of Mr. John Walker, a gentleman of independent fortune, residing at Arno's Grove, Southgate, where the subject of this memoir was born on the 31st of July, 1809. Mr. Walker—the father—had a decided taste for science, especially Natural History ; he was a fellow of the Royal and Horticultural Societies, and vice-president of the Linnæan, so that his son's almost boyish propensity for studies,in which he afterwards became so eminent, seems to have been inherited rather than acquired.

Mr. Walker's decided talent for observing noteworthy facts in Entomology was first exhibited at home, when as a mere child his attention was attracted by the butterflies, which, in the fruit season, came to feed on the ripe plums and apricots in his father's gardens ; *Vanessa C-Album* is especially mentioned ; and *Limenitis Sibylla*, another species no longer found in the vicinity of London, was then common at Southgate.

In 1816 Mr. Walker's parents were staying with their family at Geneva, then the centre of a literary *coterie*, in which they met, among other celebrities, Lord Byron, Madame de Stael, and the naturalists De Saussure and Vernet. They spent more than a year at Geneva and Vevey, and in 1818 proceeded to Lucerne, from which place Francis, then a boy nine years of age, made the ascent of Mont Pilatus, in company with his elder brother Henry ; their object, in addition to the ever delightful one of mountain-climbing, being the collecting of butterflies. The family afterwards visited Neuwied, and returned to Arno's Grove in 1820.

In 1830 the two brothers, Henry and Francis, again visited the Continent, and now it was purely an Entomological tour, the late Mr. Curtis, the well-known author of "British Entomology," being their companion. This party collected most assiduously in the island of Jersey, and afterwards at Fontainebleau, Montpellier, Lyons, Nantes, Vaucluse, &c., the French Satyridæ, of which they formed very fine collections, being their principal object.

Mr. Walker's career as an author commenced in 1832. He contributed to the first number of the "Entomological Magazine," the introductory chapter of his "Monographia Chalciditum," a work on the minute parasitic Hymenoptera—a tribe of insects which he ever afterwards studied with the most assiduous attention, and one on which he immediately became the leading authority. He was then only twenty-three years of age ; but his writings exhibited a depth of research and maturity of judgment which have rarely been excelled, and which abundantly evince the time and talent he had already devoted to these insects. It is worthy of notice that he now descended from the largest and most showy to the smallest and least conspicuous of insects, doubtless feeling that whereas among the magnificent butterflies there was but little opportunity for the discovery of novelties, among the Chalcidites everything was new—everything required that minute, patient and laborious investigation in which he seemed so especially to delight. Only two authors, Dalman and Spinola, had preceded him in devoting their attention to the structure

of these atoms of creation; and even these two had described comparatively a very small number of species.

In 1834 Mr. Walker, somewhat reluctantly, consented to undertake the editorial management of the "Entomological Magazine," and resigned the office the following year, yet continued a constant contributor to its pages. The same year he visited Lapland, in company with two of our most distinguished botanists; and in this extreme north of Europe, and especially at Alten and Hammerfest, he assiduously collected insects, more particularly the northern Diptera, the Satyridæ among Lepidoptera, and the Chalcididæ amongst Hymenoptera. During this journey we have the first and only notice of his prowess as a sportsman; he shot wild grouse and ptarmigan; and on one solitary occasion was accessory to the death of a reindeer; but as other rifles besides his own were simultaneously discharged, it is difficult to say whose was the effective bullet. I am glad to be able to record that Mr. Walker declined to give the poor creature the *coup de grâce*, and, for this especial purpose, resigned to another his *couteau de chasse*.

In May, 1840, he married Mary Elizabeth, the eldest daughter of Mr. Ford, of Ellell Hall, near Lancaster, and spent the summer on the Continent, again collecting in Switzerland with his customary assiduity.

In 1848 he explored the Isle of Thanet, the following year the Isle of Wight, and succeeding years, 1850 and 1851, he visited Geneva and Interlachen; and during the former year commenced his great work on Diptera. This formed part of a projected series of works on British insects, to be called "Insecta Britannica," a project in which the late Mr. Spence took a deep interest.

During the year 1851 was published the first volume of the "Diptera." This work is printed in 8vo., and contained 314 pages; the second volume appeared in 1853, and contained 298 pages; and the third volume in 1856, and contained 352 pages. Thus the entire work comprised nearly 1,000 pages of closely-printed descriptions.

Another tour on the Continent occupied a considerable portion of 1857, Mr. Walker visiting Calais, Rouen, Paris, Strasbourg, Baden-Baden, Heidelberg, Wiesbaden, Frankfort, Mayence, Cologne, Brussels, Aix-la-Chapelle and Antwerp. During the journey he collected in the Black Forest; and this is the only scene of his scientific labours, during the tour, of which I have any intelligence.

The summer of 1860 was devoted to a thorough exploration of the Channel Islands. Dr. Bowerbank was his companion during a portion of the time, and, as a consequence, the sponges of these islands were a main object of research—the Gouliot caves in Sark, so celebrated for their marine productions, were a great attraction to both naturalists.

In 1861 Mr. Walker's excursions were chiefly confined to North Devon; he visited Linton, Clovelly, Ilfracombe, Bideford, and Barnstaple; and now his attention seems to have been again chiefly occupied with Lepidoptera, at the scarcity of which he was greatly disappointed, having expected, from the extensive woods, to have found moths particularly abundant.

In 1863 he toured the English lakes; and, in the spring of 1865, North Wales and Ireland; and in the autumn he again visited Paris, Geneva, Lucerne, Interlachen, and Altdorf, ascending the Righi, Mont Pilatus and the Mürren, and proceeding to Kandersteg, the Oeschinen See, and the Gemmi Pass.

In 1867 we find him again in France and Switzerland, ascending the Col de Voza, and examining the Jardin of the Mer de Glace; thence over the Tête Noir to Martigny, Sion, and the Great St. Bernard; returning by St. Maurice and the Villeneuve to Geneva.

In 1869 he made the tour of the Isle of Man, and returned by Holyhead; in 1870 he paid another visit to Llanberis, as well as to all the more beautiful scenery in North Wales, crossing over to Ireland, and touring that island from south to north; and in 1871, he examined entomologically the Scilly Islands, and the districts of the Lizard and the Land's End.

In 1872 he turned his attention to Italy, visiting Rome, Piza, Lucca, Florence, Naples, Sorrento, Capri, Milan, and Venice, as well as the Lakes of Como and Maggiore.

And, finally, in the present year, he had again proceeded as far as Aberystwith, on his way to Ireland, when his intention was frustrated by illness, which terminated fatally

on the 5th of October. He died in the most perfect peace of body and of mind. For many years Mr. Walker was a member of the Linnæan and Entomological Societies of London, but resigned his membership in both some time before the close of his life.

In might be excusable in a man of such incessant bodily activity—so locomotive by inclination, so devoted to the study of Nature in all her aspects, so diligent a collector of the objects of his favourite study—had he allowed his pen to rest while his hands were engaged in forming and arranging his collections. But this was not the case with Mr. Walker, as his Catalogues of the National Collection abundantly testify. Of the Lepidoptera Heterocera, alone, Mr. Walker catalogued and described upwards of twenty-three thousand species; in addition to which he prepared similar catalogues, although perhaps not to the same extent, of the Diptera, Orthoptera, Homoptera, Neuroptera, and part of the Hymenoptera : such an amount of labour, as is testified by these catalogues, has seldom, if ever, been accomplished by one individual. But this statement by no means represents the whole of his literary labours. He contributed shorter or longer papers to the Transactions of learned societies, and to the periodicals of the day, especially to the "Zoologist" and "Entomologist;" by the indexes of the latter I find he sent thirteen communications to the first volume, three to the second, one to the fourth, thirteen to the fifth, and forty-three to the sixth; during the present year his writings appear in every number. I intended to catalogue these and his other labours, to give some idea of the number of pages, number of species and dates of each; but I can scarcely now venture to look forward to the accomplishment of this labour of love.

A word remains to be spoken of the man, apart from the scientific and accomplished naturalist. Throughout my long life I have never met with any one who possessed more correct, more diversified, or more general information, or who imparted that information to others with greater readiness and kindness; I have never met with any one more unassuming, more utterly unselfish, more uniformly kind and considerate to all with whom he came in contact. It is no ordinary happiness to have enjoyed the friendship of such a man for nearly half a century.—*Edward Newman, in The Entomologist.*

PHILIP L. SPRAGUE.

Mr. Philip L. Sprague died at Montpelier, Vermont, his native place, on the 6th day of August last, in the forty-fifth year of his age. He was elected a member of our Society in 1860.

About 1862 he commenced the study of Entomology in the Vermont State Cabinet of Natural History, displaying a marked taste for the Lepidoptera, and during the intervals of his business made considerable progress in biological investigations, as well as in the technology of the science. Circumstances soon induced him to direct his attention chiefly to the Coleoptera, and here his assiduity in making collections, his accuracy in the determination of species, and his studies in the microscopic anatomy of this order, gave his opinions weight among naturalists. His keen appreciation of the labours of his predecessors, and his love of neatness and method, evinced themselves in all he did.

At the time of his death he had been for some months a valuable assistant and member of the Boston Society of Natural History, where many of his works remain to speak for themselves. Among his associates there he was distinguished for his geniality of manner and never-failing readiness to assist younger students. At the time of his death his fame and foreign correspondence were somewhat extended, and he was actively engaged in the preparation of materials for an illustrative cabinet of the Natural History of his native State. He had published from time to time in the *Canadian Entomologist* and the Proceedings of the Natural History Society carefully elaborated results of his work, and contributed to various other periodicals devoted to his favourite branch of investigation. His fine private cabinet of insects, principally of the Coleopterous Order, in accordance with his expressed determination, form a part of the Museum of the Society to which he was attached, and is in itself no mean monument to his memory.

ON CANKER WORMS.

BY W. SAUNDERS, LONDON, ONT.

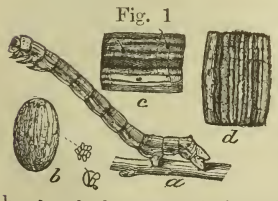
Late in the fall, when many of the leaves have fallen and severe frosts have cut everything tender, and all nature begins to look bleak and cheerless, a walk in the woods on a sunny afternoon is not without its charms. Here and there slender, delicate, silky-winged moths may be seen flitting about, apparently in a somewhat aimless manner, enjoying the genial sunshine. On capturing one, and examining it closely, we find it to be a very handsome and delicately-marked moth, with wing structure so thin as to be almost transparent, and one is naturally led to inquire how it is that so frail a creature should select so frosty and bleak a season in which to appear among us. In reply to this reasonable inquiry it may be said that appearances are deceptive; that delicate as the structure of this moth appears to be, it is nevertheless one of the hardiest of its race, requiring, indeed, some considerable degree of cold for its perfection. These moths are the product of the Canker Worm, and the winged specimens are all males.

During the last few years several valuable papers have been published on the insects known as Canker Worms, in which has been detailed much hitherto unknown in connection with their life history. Prominent among these is a paper by C. V. Riley, St. Louis, Mo., in his Second Report on the Noxious Insects of the State of Missouri, and a recent paper of his in the Transactions of the St. Louis Academy of Science; also an article by B. P. Mann, in the Proceedings of the Boston Society of Natural History, and another by H. K. Morrison, in the 6th volume of the *Canadian Entomologist.* In the following summary of what is known respecting these insects we shall make free use of these, as well as previous writings, without further acknowledgment.

In 1795, Prof. W. D. Peck wrote his "Natural History of the Canker Worm." This paper was awarded a prize by the Massachusetts Society for Promoting Agriculture, and was published in their Proceedings. At this early period all the insects passing under this name were supposed to be one and the same species; but later and more careful observation has led to a modification of this view, and it is now universally admitted that there are two distinct species possessing similar habits, and having many points of resemblance—one producing the perfect insect in the fall, the other partly in the fall and partly in the spring, the former species being known under the name of *Anisopteryx pometaria,* the latter as a *Vernata.* The latter species will first claim our attention.

Anisopteryx Vernata.

Fig. 1



At *b* fig. 1 we have a representation of the egg of this species on an enlarged scale, the natural size being shown in the small cluster adjoining. In form it is not unlike a miniature hen's egg, but is of a very delicate texture and pearly lustre, with irregular impressions on its surface. The eggs are laid in masses, without any regularity or order in their arrangement, often as many as a hundred together, and secreted in the crevices of the bark of the trees infested. The eggs are usually hatched between the first and middle of May, about the time when the young leaves of the apple tree begin to push from the bud. The little canker worms, on making their escape from the egg, cluster upon and consume the tender leaves, and on the approach of cold or wet weather creep for shelter into the bosom of the expanding bud or into the opening flowers. The newly-hatched caterpillar is of a dark olive green or brown colour, with a black shining head, and a horny plate of the same colour on the second segment. When full grown they measure

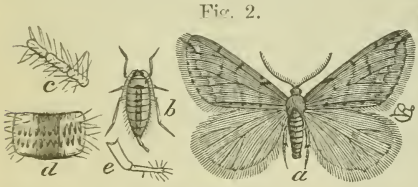
about an inch in length, and present the appearance shown at *a*, fig. 1 : in the same figure *c* represents a side view, and *d* a back view of one of the joints or segments of the body, enlarged so as to show their markings. These caterpillars are called "loopers," because they loop their bodies when in motion.

The colour of the body of the larva varies from greenish yellow to dusky or even dark brown. The head is mottled and spotted, and has two pale transverse lines in front; the body is longitudinally striped with many narrow pale lines ; along the sides the body becomes deeper in colour, and down the middle of the back are some blackish spots. When not eating they remain stretched out at full length, and resting on their fore and hind legs under the leaves.

When full grown they leave the trees, either by creeping down the trunk or by letting themselves down by silken threads from the branches. When thus suspended in great numbers, as is frequently the case, under the limbs of trees overhanging roads and sidewalks, they become a great annoyance, especially to over-sensitive pedestrians, and are also often swept off by passing vehicles, and in this manner conveyed to other places. Having reached the ground, they soon begin to burrow into it, and having penetrated from two to six inches, a simple earthen cell is formed by compressing the earth, and lining it with a few silken threads ; this makes but a fragile home for the chrysalis, and is easily broken to pieces.

The chrysalis, which is about five lines long, and one-and-a-half in diameter, is of a pale, greyish-brown colour, with a greenish tint on the wing-sheaths in the male ; that of the female is more robust than the male, and both are sparingly pitted with shallow dots over their surface. Sometimes the chrysalis produces the perfect insect late in the autumn ; in other cases it remains quiescent during the fall and winter months, emerging during the first warm days of early spring.

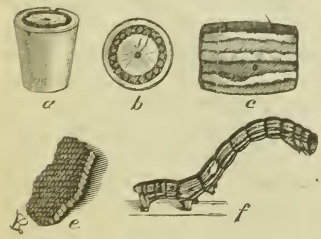
Fig. 2.



The female moths of both species of canker worm are wingless, and present a very odd, spider-like appearance (see *b*, fig. 2, and *b*, fig 4), but with none of the activity of that predacious race with a body distended with eggs, she drags her weary way along in a most ungainly manner, until she reaches the base of a suitable tree, up which she climbs, and there awaits the arrival of the male. The abdomen of the female as well as that of the male of this species *vernata*, *b* fig.2, have upon the hinder margin of each of the seven rings of the abdomen two transverse rows of stiff, reddish spines, pointing backwards. At *d* fig. 2, we have represented a joint of the abdomen showing these spines. *c* represents a portion of the antenna of the female, and *e* her retractile ovipositor.

The male, *a* fig 2, is active, although a delicate and slender-looking creature. Its fore wings are ash-coloured or brownish grey, of a silky, semi-transparent appearance, with a broken whitish band crossing the wings near the outer margin, and three interrupted brownish lines between that and the base. There is an oblique black dash near the tip of the fore wings, and a nearly continuous black line before the fringe. The hind wings are plain, pale ash-coloured, or very light gray, with a dusky dot about the middle of each.

Anisopteryx pometaria.



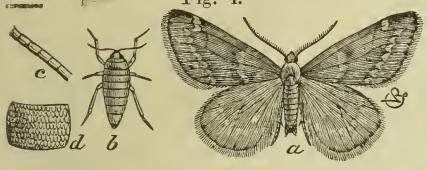
This species, although, as already remarked, closely resembling the preceding species, has many points of difference. The eggs—see *a* and *b*, fig. 3—are flattened above, have a central puncture and a brown circle near the border, and are laid side by side in regular and compact masses, *c* fig. 3, and are usually deposited in exposed situations.

The newly hatched caterpillar is pale olive green, with the head, and horny covering of the upper part of the second segment of a very pale hue. The full grown caterpillar, *f* fig. 3, is also differently marked ; *c* represents a

side view of a single joint of the mature caterpillar enlarged; the longitudinal lines are fewer in number, but broader and more distinct.

The chrysalis is much tougher than that of the former species, being formed of densely spun silk of a buff colour, interwoven on the outside with particles of earth.

Fig. 4.



In the male moth, *a* fig. 4, the antennæ have a greater number of joints, there being fifty or more in this species, whereas in *vernata* there are not quite forty. The wings are less transparent but more glossy, the fore wings brownish gray but of a darker hue than in the other species, and are crossed by two more regular whitish bands, the outer one enlarging near the apex, where it forms a large pale spot. The hind wings are grayish brown, with a faint central blackish dot, and usually a more or less distinct white band crossing them.

The female, also, has a correspondingly greater number of joints in her autennæ; the abdomen in both sexes is without spines, and that of the female terminates bluntly and is without an ovipositor. In fig. 4 *b* represents the female moth, *d* a segment of her abdomen, and *c* a portion of one of the autennæ.

Where the canker worms are numerous they are very destructive to apple trees, but are by no means confined in their operations to this particular tree; they also attack the plum, the cherry the elm and a variety of other trees. In most localities where they occur they multiply rapidly, often enormously, and do an amount of damage corresponding with their numbers. The very young worms on the trees are seldom noticed, but as they acquire age and increasing voracity the riddled and seared appearance of the foliage speaks unmistakably of their presence. In the New England States they have been a terrible pest for many years, and are now becoming plentiful in portions of Ontario particularly in some parts of the Niagara district.

Remedies.

In order to attack an enemy with success it is very essential that we know his vulnerable points. In the case of these insects, since the females are without wings, if they can be prevented from crawling up the trees to deposit their eggs a great point will be gained. Various measures have been recommended and employed to secure this end, and these remedies usually belong to one of two classes: first, those which prevent the ascension of the moth by entangling her feet and holding her there or by drowning her; and second, those which endeavour to accomplish the same end by preventing her from getting a foothold, and causing her repeatedly to fall to the ground until she becomes exhausted and dies.

The first class of remedies are probably the most effectual, and tar, applied either directly around the body of the tree or on strips of old canvas or stiff paper, is probably one of the cheapest and best of these. Refuse sorghum molasses, printers' ink or slow drying varnishes have also been recommended for use in the same manner. Tin, lead and rubber troughs to contain oil, belts of cotton wool, &c., also belong to this class of remedies, and have all been used with more or less success. In the use of any of the first named sticky substances it should be borne in mind that they must be kept sticky by frequent renewal of the surface in all mild weather or the application will be useless; they should also be applied as early as the latter part of October and kept on until the leaves are well expanded in the following spring. It must also be remembered that some of the moths, defeated in their attempts to climb the tree, will deposit their eggs near the ground or anywhere, in fact, below the application, and that the tiny young worms hatched from them will pass without difficulty through a very slight crevice; hence, whether troughs or bandages are used, precautions must be taken to fill up all the irregularities of surface in the rough bark of the trees, so that no openings be left through which they may pass. Cotton wool answers well in many cases for this purpose.

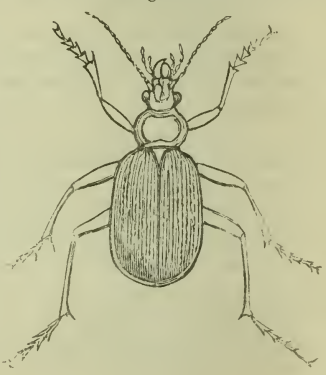
The second class of remedies consist of various ingenious designs for collars of metal, wood or glass fastened around the tree, and sloping downwards like an inverted funnel. These, although they prevent the moths from ascending the trees, offer little or no ob-

stacle to the ascension of the young caterpillar; hence they often fail of success. The remedies belonging to the first class are then the surest and best; and although it must be admitted that it involves much time and labour to renew from time to time, for so long a period, the tar or other sticky application, so as to make it an effectual bar to the ascent of the insect, as well as a trap for its unwary feet, still it will doubtless pay well wherever the canker worm abounds, to give this matter the attention requisite to make it a success. The limited powers of motion possessed by the female necessarily restrict it within a narrow circle; hence it is very local in its attacks, sometimes abounding in one orchard and scarcely known in another a short distance off; it follows that when once it has obtained a footing and is neglected it must multiply prodigiously.

Fig. 5.

The canker worms moreover have natural enemies which prey upon them. A small mite (*Nothras ovivorus*) has been observed devouring its eggs, and doubtless some of the active little birds which winter with us do good service in the same direction. Two species of four-winged flies and one species of two-winged fly are known to be parasitic on these worms, and to destroy numbers of them; some of the ground beetles also feed on them, particularly the copper-spotted carab (*Calosoma calidum*) (fig 5), and its ally with the golden green wing cases and beautiful varied hued body (*Calosoma scrutator*) (fig. 6). These active beetles may often be seen mounting the trunks of the trees and carrying off such soft-bodied worms. A species of wasp (*Eumenes fraterna*) is also said by Harris to store her cells with canker worms as food for her young, often gathering 18 or 20 of them for a single cell.

Fig. 6.



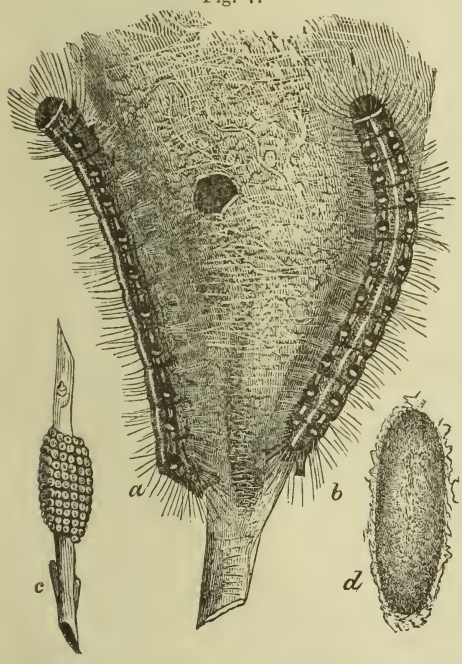
NOTES OF THE YEAR.

By W. Saunders, London, Ont.

During the past summer there has been an unusual scarcity of insect life. Whether this is to be attributed to the extreme severity of the winter, or to the very dry summer which preceded it, we are unable to determine ; possibly both may have had something to do with the result. Our usually common butterflies were seldom seen during the summer, and those nocturnal visitors, the moths, as compared with the abundance of average years, were "few and far between." The same scarcity has been noted among our insect pests—the plagues of the gardener and fruit-grower. Some, which have been abundant for many years past, were notably scarce, viz. :

The Tent Caterpillar (*Clisiocampa Americana*), Harris.

Fig. 7.



Some years ago, the caterpillars of this species were enormously abundant. They were to be seen in almost every orchard, stripping the apple, cherry and plum trees of their foliage, and playing similar pranks among our thorn bushes, wild cherry trees, and other trees and shrubs in our woods and along our roadsides. Everyone must be familiar with the white web-nests of this caterpillar. They have, however, been lessening in numbers in the western portion of Ontario for several years past, until now their presence is scarcely felt as an annoyance. The lessening of this evil is doubtless due partly to the vigilance of our farmers and fruit-growers ; for while with us this insect has been decreasing, in many parts of Lower Canada, where the cold of winter is much more intense than with us, the destruction of trees by this tent caterpillar is bitterly complained of, and they remain as abundant or more abundant than ever ; and the same remarks will apply to some of the eastern sections of our own Province. We trust, also, that some portion of the credit of our almost exemption from this pest may be due to the information scattered broadcast from year to year in our Annual Reports, by which our farmers and fruit-growers have been instructed how to contend with this and various other insect enemies in the most advantageous manner.

A cluster of the eggs from which these caterpillars hatch are shown at *c*, fig. 7. They are generally deposited during the month of July upon the smaller twigs of our fruit trees, each one containing upwards of 200 eggs, sometimes more, all enclosed in an oval ring-like cluster, firmly cemented together and coated with a varnish which is alike uninjured by sun or rain. About the time when the buds begin to burst, these caterpillars hatch, and at once begin to spin for themselves a web or covering, in which they can take

refuge from their enemies, or shelter from inclement weather. The web is spun in concert, each one doing his own part in the construction of this convenient home for the little community.

They have their regular times for feeding, issuing from the orifice of their tent in processional order, usually once in the forenoon and once in the afternoon. In about six weeks they become full grown, and then present the appearance shown at *a* and *b*, fig. 7; *a* shows a side view and *b* a back view of the same caterpillar. The body is black, about two inches long, with a white stripe down the back. On each side of this central stripe there are a number of short irregular longitudinal yellow lines. On the sides are paler lines, with spots and streaks of pale blue. The under side of the body is nearly black.

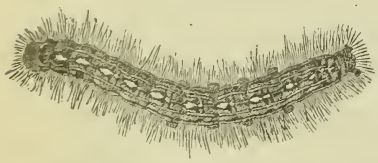
As these caterpillars approach maturity, they lose their social habits, and, leaving their friends and kindred, they wander about singly in all directions. The main object of this dispersion seems to be the finding of separate and secure retreats, in which to pass the chrysalis stage of their existence—in crevices in the rough bark of trees, on the lower edges of boards where they are nailed to the posts of fences, in holes in the posts, and in a variety of other situations of a similar character, where they will be sheltered from the weather. Here their cocoons are spun, and within the enclosure the larva changes to a chrysalis. The cocoon is oval, of a pale yellow colour (see *d*, fig. 7), and in its construction the silk is mixed with a pasty substance which, when dry, becomes powdery, and is partly removed from the surface of the cocoons by handling. The chrysalis, which lies within the cocoon, is about three-fourths of an inch long, and of a pale brown colour.

At the expiration of two or three weeks the moths escape from the cocoons. They are of a dull reddish colour, varying in depth of shade, with two straight whitish stripes, which extend across the fore wings obliquely, dividing the wing into three nearly equal portions. The females sometimes have the two stripes closer together; in the males they are less variable. The hind wings are nearly of the same colour as the front ones, but without any stripes. In both, the under surface is very similar to the upper, and the wings when expanded measure from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches or more.

The moths usually appear early in July, when, on sultry evenings, they come thumping against the lighted windows of our houses, and if they gain access, they fly about the lights in the room with great rapidity, and in the wildest and most bewildered manner, striking violently against any and every object which opposes their progress. A few days after their appearance on the wing they pair, and then the females begin to deposit their eggs on the twigs of our fruit trees, in the belt-like masses we have already referred to.

Another and a very similar species is known as the "Forest Tent Caterpillar" (*Clisiocampa sylvatica*), so called because it is frequently found on forest trees, although it is also very destructive to the apple. The eggs are laid in the same manner as the last species named, and in masses about the same size; the caterpillars, too, resemble each other, but may be at once distinguished by the peculiar markings down the back. In the former species the white forms a continuous and prominent stripe; in this one the stripe is replaced by a row of white spots (see fig. 8). There are other minor points of difference, but this one character is invariable, and will enable any one to separate the species without difficulty. Some few years ago the western section of Ontario was overrun by this caterpillar, whole orchards having been completely defoliated as if a fire had passed over them, and the trees greatly damaged thereby; but the vigilance of our farmers, aided by the natural enemies of these insects, has been successful in reducing their numbers so considerably that they have ceased to be a source of much anxiety. These caterpillars usually select the side of a tree on which to spin their web, rather than a fork of one of the limbs, and when nearly full grown scatter as in the case of the other species, and wander about singly in search of suitable locations in which to spin their cocoons. These latter are scarcely distinguishable from that already described; the moths also may easily be confounded with those of *Americana*, but they are usually somewhat smaller in size and paler in colour, while the oblique lines on the anterior wings are dark in place of nearly white.

Fig. 8.



This insect in the larva state is attacked by the same species of ground beetles as are described in the article on canker worms; they are also subject to the attacks of several species of parasites, which thin the ranks of the enemy most thoroughly. As far as man's agency is concerned, they are most effectually fought in the egg state; by looking carefully over one's trees during the winter season, the egg masses are readily detected, when they should be removed and destroyed. A second examination of the trees should be made in spring, when the young foliage begins to push forth; then any clusters which have escaped observation will be found to have hatched, when the young larvæ in their small web should be carefully collected and destroyed.

The English Cabbage Butterfly (*Pieris Rapæ*).

This destructive pest is rapidly spreading westward. During the past season it has appeared for the first time in London and the neighbourhood, and will probably reach the western limits of the Province before the end of the summer of 1876. A description of this insect was given in our Society's Report for the year 1871; but since that Report is not now within reach of many of our members, for their benefit we will again give a brief summary of the history of this insect, describing its appearance in the various stages of its existence.

It was brought to Quebec from Europe most probably in the egg state on cabbage leaves, about the year 1857 or 1858, its advent being chronicled by an entomologist in Quebec, in 1859, when the first specimens were captured. In 1863 the insect had become very abundant about Quebec, and was supposed at that time to have extended some 40 or 50 miles east and west of the city, but probably it had spread further, for in the summer of 1866 we found it very common about Chicoutimi, at the head of navigation on the Saguenay River, and during that same year the butterfly was taken in Vermont and New Hampshire, and by the end of 1870 had overspread a large portion of the middle States. Every year since its introduction the area occupied by it has been extended in every direction, until now it has spread as far east as Halifax, N. S.; farther south than Baltimore, Md.; and west as far as the western portion of Ohio. In Canada, during the same period, it has been gradually spreading westward. Last year it was common about Hamilton, and early this summer had extended as far as Paris, and later in the season the first recorded captures were made in London.

The cabbage butterfly is white, with a black dash at the tip of the fore wings, a black spot on the front margin of the hind wings, and in the male (see fig. 9) *one* black spot in

Fig. 9.

Fig. 10.

the middle of the fore wings, but in the female (see fig. 10) there are two. The under side of the fore wings in both sexes is marked by two spots, corresponding to those on the upper side in the female; in other respects the wings are very much alike on both sides, except that beneath there is a tint of yellow at the base and tip. Occasionally male specimens are found of a bright yellow colour, almost like our common sulphur yellow butterfly (*Colias philodice*).

The eggs of this insect are laid on the under side of cabbage leaves, singly or in clusters of two or three, where they are attached by some adhesive substance. They are so very small that they easily escape observation; in shape they resemble a sugar loaf, and under a sufficient magnifying power their surface appears beautifully ribbed and sculptured. When newly deposited the eggs are white, but they soon acquire a yellow tinge, and in about a week they hatch, the enclosed worm escaping by gnawing a hole

through the egg shell, after which it devours the remainder of the egg shell, and then sets to work with an insatiable appetite on the cabbage leaves.

Fig. 11.

In about a fortnight after hatching, the caterpillar (*a*, fig. 11) has acquired its full growth. It is then about an inch and a quarter long, of a pale green colour, finely dotted with black, with a yellowish stripe down the back, and a number of small yellowish spots forming a broken stripe along each side. When fully fed and about to transform, it leaves its food plant, and taking shelter under the coping of some wall or fence, or other convenient hiding place, there changes to a chrysalis. The chrysalis (*b*, fig. 11), which is somewhat variable in colour, is usually pale green, sprinkled with very small black dots. The period passed in the chrysalis state varies at different portions of the season. In the summer the chrysalis usually becomes a butterfly within a fortnight; later in the season it remains unchanged until the following spring. There are at least two, perhaps three broods during the year, and the ratio of increase of the insect is enormous.

The caterpillar is dreaded by cooks in every country where it prevails; it is not content with riddling the outside leaves, but prefers to secrete itself in the heart, so that every cabbage has to be torn apart and carefully examined before being cooked; and even after it has been dished up, one needs a watchful eye to avoid an undesirable admixture of animal with vegetable food.

Remedies.

One method suggested is to search for the eggs at the proper season and destroy them; another, to employ children with nets to catch the butterflies, and as these latter are rather slow and heavy flyers, this is not a difficult task; while a third method recommended is to lay boards between the rows of cabbages, supporting them two or three inches above the ground, with the view of luring the worms to select such places in which to pass the chrysalis stage of their existence, and so secure their destruction. Objections can be readily found to all these methods, but they are the best which man's experience has yet enabled him to devise. The use of poisons such as Paris Green and Hellebore is not admissible in this case on account of the difficulty of freeing the plant from such substances before cooking.

Nature has, however, provided a remedy; a small parasitic fly (*Pteromalus puparum*) attacks the chrysalis of this species in Europe, and, strange to say, has in some unknown manner also found its way to this country. This is a little four-winged fly about one-eighth of an inch long, with a yellowish body. The female flies about in search of the chrysalids, which she punctures with her ovipositor, inserting a number of eggs in each; in a short time these hatch into tiny grubs, which consume the substance of the chrysalis; as many as forty or fifty of these have been found in a single case. This little friend is now quite common in the State of New York, as well as in the eastern parts of Canada. It is probable that gardeners will suffer much from the depredations of the caterpillar for several years, until the parasite reaches us, and has multiplied to a sufficient extent to keep the depredator within moderate bounds. In the meantime it may be expected to extend its march westward and northward through our own country, and over the fertile plains of the neighbouring States away out to the far west.

The Pear Tree Slug (*Selandria cerasi*).

In our Report last year we referred to this insect at some length, and detailed to some extent its ravages in our own neighbourhood. The havoc this disgusting little slug made among the pear trees was terrible, consuming the leaves so thoroughly that the trees looked as if they had been scorched by fire—in many instances every leaf dropped from the trees, leaving them for a time as bare as in midwinter; fully a thousand trees in the young pear orchard of the writer suffered severely. Following on the heels of this destructive pest we experienced a winter of unusual severity, when, as might be expected, a large number of these trees, thus weakened, perished from the cold. The extreme winter, however, was not an unmitigated evil. The low temperature which killed the en-

feebled trees operated disastrously also on the chrysalids of these slugs, and the result has been that where there were hundreds of thousands last year, during this summer scarcely any could be found—so few have been their numbers that no effort has been necessary to subdue them. Fig. 12 represents the parent of this sometimes troublesome pest, a small, black, four-winged fly, and fig. 13 the larva, or slug, in various stages of its growth. For the benefit of those who may not have the Report of last year to refer to, we would say that to shower the infested leaves from the rose of a watering-pot with powdered hellebore and water, in the proportion of one pound to a barrel of water, is so effectual that it leaves nothing further to be desired.

Fig 12.

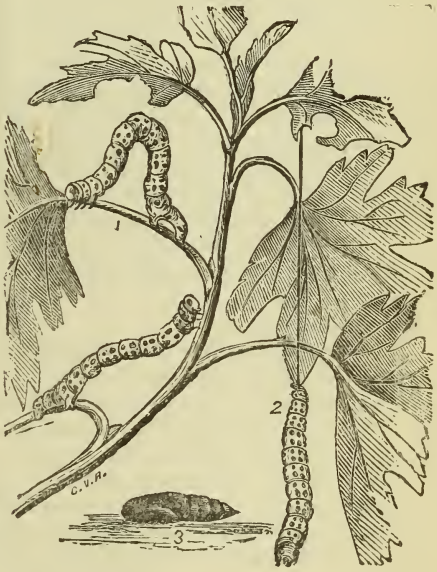
Fig. 13

THE GOOSEBERRY WORM (*Nematus ventricosus*).

This insect also was mentioned in our last Report as having been extremely abundant and very destructive; this summer, on the contrary, it has been unusually scarce. In past seasons constant watchfulness was required to prevent the currant and gooseberry bushes from being eaten bare. In 1875 little or no effort has been needed to keep it within bounds. This insect also passes the winter in the ground in the chrysalis state, and has probably suffered from the same causes which proved so fatal to the pear tree slug. To avoid misapprehension, we introduce again the figure of the larva (see fig. 14).

Fig. 14.

Fig. 15.



Very different is our experience with the other currant worm, known as the measuring worm, (*Abraxis ribearia*), shown at fig. 15. This creature passes the winter in the egg state, and hence did not seem to suffer at all, the eggs of insects being capable usually of enduring the most severe cold without injuring their vitality. This larva has been very abundant and destructive, probably more so in Western Ontario than ever before; they are not so easily destroyed by hellebore as the other species is. If used in the liquid state it should be made about double strength; probably the better plan in this case is to first sprinkle the bushes with water, and then dust the powdered hellebore lightly on, the operator taking proper care to avoid the inhalation of the dust.

THE POTATO BEETLE (*Doryphora decemlineata*).

This insect (see fig. 16) continues its progress eastward and southward. During

Fig. 16.

the past season it reached as far as Ottawa, and in some of the New England States has approached the sea shore. It is quite possible that before long it may cross the Atlantic secreted among the merchandise carried thither by vessels. During the summer they will survive many weeks without a particle of food, and could easily endure the abstinence which a voyage across the Atlantic would entail. Already many of the European Governments have taken measures of precaution against their introduction, and we sincerely hope that these measures may be successful. Throughout Ontario this insect has not proved so great a scourge as was anticipated, and notwithstanding the immense numbers in which they have appeared, they have scarcely influenced the price of that valuable esculent, the potato, not even in the worst affected districts. We can only attribute this result to the persistent application by our farmers of that valuable remedy, Paris green. Notwithstanding the outcries which some have made against its use, general experience has decided immensely in its favour, and it is almost universally used. During the past summer a series of interesting experiments have been carried on by the chemist of the Department of Agriculture in Washington, with the view of ascertaining how far the soil could be impregnated with Paris green without operating disastrously on vegetable growth. The results of these experiments have shown that any reasonable amount of Paris green required for the destruction of the potato beetle may be used without influencing the soil to the detriment of plant life to any perceptible extent.

It is nevertheless true that in many cases larger quantities of this poisonous substance have been used than there was need for, and some cases of irritation, arising from carelessly inhaling the dust of the powder while applying it, have been reported to us. The use of the Paris green with water is becoming much more general, and is highly approved of by those who have used it in that manner. If the Paris green be of good quality, from one to two teaspoonfuls will be sufficient for a pailful of water. This mixture is occasionally agitated so as to keep the powder suspended in the liquid, and applied with a whisk or small broom, which is first dipped in the liquid and then shaken over the vines. At first sight this seems a laborious process, but most of those who have tried concur in the opinion that it involves no more labour than is required for an application of the powder; that it takes much less Paris green to the acre, and has the additional advantage that it can be applied at any time during the day and in all weathers.

THE APPLE TREE BLIGHT.

This mysterious disease, which was first referred to in our last Report, if not on the increase throughout our Province, is in some districts manifesting an intensity which at first was not expected. This has been especially the case with the trees in the orchards and nursery of Mr. James Dougall, of Windsor. These were visited by the writer on the 10th of August last, in company with some friends, including Thos. Meehan, Editor of the *Gardener's Monthly*, Philadelphia, and Professors Beal and Cook, of the Agricultural College of Lansing, Michigan.

We found that, in addition to the ordinary form of this tree-blight affecting the twigs

of the current year's growth only, that there was a blight causing the entire destruction of some of the large limbs of several of the trees. Many of the twigs on these limbs had been blighted the previous year or years, and it is possible that this more serious blight of the limbs is but an extension and further development of the twig blight. On examining the base of the blighted twigs and fruit spurs it was found that where these were killed to the point of junction with the wood that the discolouration arising from the disease extended into the wood of the branch, which seems to point to the probability of the correctness of the suggestion just made. On the other hand, seeing that its character is somewhat distinctive, it may be inferred that it is an entirely different form, resulting from the presence and development of a different species of fungus ; so obscure are the distinguishing features which separate these lower forms of vegetable life, that it would require much close study to determine this point.

The twig blight had affected many of the older trees in Mr. Dougall's orchards so much as to give them a decidedly withered and browned aspect, pervading the entire circumference, and distributed with much apparent regularity over their many branches. It had also injured to a very great extent the young apple trees in his nursery rows : in these the injury appeared to begin in the tips of the upper branches, and from thence spread downwards, extending in many instances half way down the trunk of the tree. Evidences of the extension of the blight were to be seen sometimes in the discolouration of the outer bark, in patches below apparently uninjured portions. In some of these small trees the twigs were blighted down the trunk to near its base, while the trunk remained apparently sound. The odour of the affected twigs, when broken, was very similar to that given off from pear blight. Many of the young trees in the nursery rows had been smitten by the disease early in the summer, and Mr. Dougall had pruned many of these, cutting away the whole of the diseased portion down to the healthy growth, but in most instances the blight attacked the remaining portions, and extending downwards involved more or less of the trunk to its base, indicating probably that the fungoid germs had extended in the sap through the adjoining tissues, without producing as yet any external appearance by which their presence might be recognised.

ON SOME OF OUR COMMON INSECTS.

By W. Saunders, London, Ontario.

In accordance with the plan pursued in our Reports for several years past, we present our readers with a chapter on some of our common insects; and although in this instance we include some which are more or less injurious, still we think they claim attention more from the frequency of their occurrence than from the amount of injury they do. They also in some instances excite curiosity, and elicit admiration on account of their great beauty, or in consequence of their peculiarities.

The Beautiful Deiopeia (*Deiopeia bella*).

This lovely moth, represented in fig. 17 (after Riley), may well claim a place among the most elegant and beautiful of the Lepidoptera. Although rare in some parts of our Province, they are quite common in other localities. We have found them common in the neighbourhood of Port Stanley, on the shores of Lake Erie, and they are usually common and sometimes abundant about Grimsby, Ont. We have also seen them in insect collections from various parts of Canada.

Fig. 17.

This moth measures when its wings are expanded about one and a half inches. Its fore wings vary in colour from lemon yellow to orange, and are crossed by six white bands, each containing a row of black dots. The hind wings vary in colour from pink to scarlet red, with an irregular border of black behind. The fringes of the wings are white.

The under surface of both pairs of wings is of a deep red colour, with the front edge of the fore wings yellowish; the white bands on the upper surface of the fore wings are not reproduced, but the black dots are more prominent, and being more or less confluent, appear as broken bands. The hind wings are marked nearly as above.

The head is white, spotted with black; the shoulder covers white, with some yellow at the base, and two black dots on each; the thorax and abdomen whitish, the former with six black dots, the latter banded with black beneath.

Drasteria Erichtea (Cram.)

In fig. 18 we have this insect in the perfect state well represented. Although it is one of our commmonest moths, a day-flier, abundant almost everywhere, yet we have never heard of its having had a common name bestowed upon it. We are not going to christen it, for we are no admirer of common names where they can be avoided, and we think they can in this instance. *Drasteria erichtea* is not harsh and unpronounceable, as is the case with many, especially of our more recent names, as well as some that have been resurrected, and those who do not care to burden their memories with both names, may drop the latter, and will still be understood if they speak of the moth as "the common *Drasteria*."

Fig. 18.

The female moth, when its wings are spread, will measure about one and a half inches; the male about a quarter of an inch less. The fore wings are grayish brown, with bands and dots of dark brown; one band crosses the wing about an eighth of an inch from the base, and a second—which sometimes does not extend entirely across—is placed midway between the first and the outer margin. There is a dull patch of brown near the front edge of the wing, between the first and second bands, and two or three prominent black dots similarly situated between the second band and the apex; the outer edge is also widely margined with brown.

The inner portion of the hind wings is similar in colour to the front pair; the outer half is crossed by two darker bands irregular in outline, the space between them being occupied by a paler hue, as also is the space between the outside band and the hind margin, which latter is narrowly bordered with the darker shade. The markings on both wings vary much in intensity, being sometimes almost black, in other instances very faint.

The under surfaces of both wings are much paler, with the markings of the upper surface partially but indistinctly produced.

Drasteria erichtea appears among our earliest insects in spring, having passed the winter in the chrysalis state; it is also found up to quite a late period in the autumn. It frequents fields and meadows, and open grassy spots along the sides of our railroad tracks. Its flight is sudden, and after a short but rapid course, it as suddenly alights.

The caterpillar feeds on clover, and when full grown measures one and a quarter inches in length or more. It has a medium sized head, rather flat in front, with darker longitudinal lines. The body above is reddish brown, with many longitudinal lines and stripes of a darker shade. There is a double whitish line down the back, with a stripe of the darker shade of brown on each side, and lower down, close to the spiracles, is another stripe of the same dark hue, while between these two are faint longitudinal lines. The spaces between the segments, from fifth to eighth inclusive, are nearly black above, a feature only seen, however, when the body is coiled up; the larva readily assumes this attitude when disturbed.

The under surface is a little darker than the upper, with many longitudinal lines of a still deeper shade, and a central stripe of blackish green from the sixth to the ninth segments. The feet and prolegs are greenish and semi-transparent, with faint lines and darker dots. This larva has but three pairs of prolegs, and hence it alternately arches and extends its body in progression.

The specimens from which the above description was taken were full grown by the third week in September, when they became chrysalids, and remained in that condition until early the following spring.

The Beautiful Wood Nymph (*Eudryas grata*).

This moth (see fig. 19) is truly a beautiful creature. Its fore wings are creamy white, with a glossy surface, with a wide brownish purple stripe along the anterior edge, reaching from the base to a little beyond the middle of the wing. On the outer margin is a broad band of the same hue, widening posteriorly, with a wavy white line running through it, composed of minute pearly dots or scales. It is bordered internally with dull deep green. The brownish purple band is continued along the hinder edge, but it is much narrower here, and terminates a little before it reaches the base. There are also two brown spots, one round, the other reniform, near the middle of the wing, often so suffused with pearly white scales as to be indistinct above, but clear and striking on the under side.

Fig. 19.

Colours, creamy white and brownish purple.

The hind wings are reddish yellow, with a broad brownish purple band along the outer margin, extending nearly to the outer angle, and powdered here and there with a few whitish pearly scales; there is also a faint dot on the middle of the wing, which is reproduced more prominently on the under side. The under surface of both wings is red-

dish yellow. The head is black, and there is a wide black stripe down the back, merging into a series of spots of the same, which extend nearly the whole remaining length of body. The sides of the body are reddish yellow, with a row of blackish dots close to the under surface. The fore legs are beautifully tufted with white, the shoulder covers also are white, and so is the under surface of the body.

When this moth is at rest—that is, during the day time—its wings are closed like a roof over its back, and its tufted fore legs are stretched out.

The insect passes the winter in the chrysalis state, emerging as a moth from the middle of June to the middle of July. The earliest recorded date we have of the appearance of the moth is June 25th. It is usually common during the last week in June and the first in July, when it may often be found in the day time fast asleep on the leaves of the grape vine.

Soon after the moths appear they begin to deposit their eggs. These are among the prettiest and most beautiful of insect eggs ; at *e*, fig. 20 (after Riley), we have a view of the upper surface, and at *f* a side view of this charming object. It is round and very flat ; its colour is yellowish or greenish yellow, with an enclosed ring of black placed a little beyond the middle, and sometimes nearer to the outer margin. In the centre of the egg is a large, nearly round dot, and at a little distance from this a circle of smaller dots, from which arise a series of from 24 to 27 raised striae, diverging equally as they approach the outer edge, and crossed by many gracefully curving lines which interlace also the spaces between.

Fig. 20.

When mature, the young caterpillar escapes from the upper part of the egg, lifting the centre and rupturing the portion placed over the black ring. In some cases we have observed the eggshell to be eaten by the newly hatched larva ; in others it remains almost untouched. The young larvæ have a strange habit of twisting their hinder segments and throwing them forward, resting on the anterior segments in a curious manner. At this age they eat small holes all over the vine leaves in different parts ; they are often solitary, but sometimes two or three may be found on a single leaf.

When mature, the full grown larva appears as at *a*, fig 20 ; it is then nearly one and a-half inches long, tapering towards the head, thickening towards the posterior extremity. The head is of an orange colour, with a few round black dots and pale brownish hairs.

The body above is pale bluish, crossed by bands of orange and many lines of black. Each segment, excepting the terminal one, is crossed by an orange band, all of which are nearly uniform in width, excepting that on the 12th segment, which is much wider. These are all more or less dotted with round black dots, from each one of which arises a single short brown hair. There are also crossing each segment six black lines, placed nearly at equal distances along each side, but with a wider space in the middle, where the orange band occurs. The twelfth segment is much raised, and the terminal one suddenly sloped. The under side is very like the upper, and also marked with orange and black ; feet and prolegs orange, spotted with black.

The larvæ feed on Virginia Creeper (*Ampelopsis quinquefolia*) as well as on the grape-vine, and Mr. Bowles, of Montreal, has found them feeding on the hop.

When full grown, they descend to seek some secure retreat in which to pass the chrysalis, or inactive stage of their existence. They are fond of boring into old pieces of wood, and in the chambers thus formed they find secure lodgment ; they will also bore into corn cobs. When rearing them we have supplied pieces of cork for this purpose, and have had as many as twenty-one chrysalids enclosed within two small bungs about 1½ inches in diameter, and one inch thick. The excavation is but little larger than the chrysalis which is to rest in it ; it is not lined with silk, but is made moderately smooth, and is furnished with a cap or cover composed of minute fragments of cork, formed into a sort of membrane by means of a glutinous secretion mixed with threads of silk. When nicely finished, the surface of this cover is slightly glossy, the glossiness extending a little beyond the actual orifice, indicating that the glutinous matter has been of a thin consistence and has spread a little during its application. When the lid is lifted the head of the chrysalis is usually found quite close to it.

Fig. 21.

The chrysalis is about seven-tenths of an inch long, of a nearly uniform dark brown colour, and roughened with small blackish points or granulations.

This insect is subject to the attacks of a parasite, a two-winged fly—a Tachina—probably the species known as the red-tailed Tachina fly, *Exorista leucania* (see fig. 21, after Riley). It is not much unlike the common house fly in appearance, is about a quarter of an inch long, with a white face, large reddish eyes, a dark hairy body with four, more or less, distinct lines down the thorax, and patches of a greyish shade along the sides of the abdomen. The parent fly deposits her eggs on the back of the caterpillar, usually a short distance behind the head, where they are cemented firmly by means of a peculiar secretion with which the insect is furnished. Three or four of these eggs are usually placed upon a single caterpillar, where, after a few days, they hatch, when the tiny worms eat their way through the skin into the interior of the body, where they feed upon the fatty matters, instinctively avoiding the vital organs. When the caterpillar is about full grown it dies, and from its body emerge these three or four full-grown whitish grubs, which soon after their exit change to chrysalids. These are nearly one-fifth of an inch long, oval, smooth and of a dark brown colour, from which in due time the perfect flies escape.

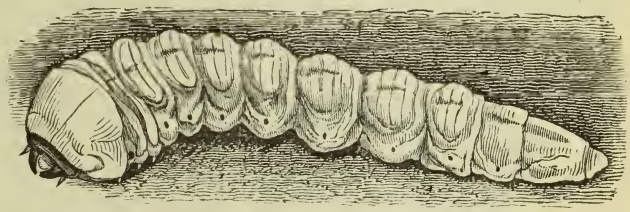
The Cylindrical Orthosoma (*Orthosoma cylindricum*, Fabr.)

This formidable-looking, long-horned beetle, fig. 22, is very common in most portions of Ontario during the month of July. It flies at night with a rapid and noisy flight, entering the open windows of lighted rooms during the evenings, often to the great alarm of nervous inmates. This beetle measures an inch and a quarter, or even more in length, and is about one-third of an inch in width. Its body is long and narrow, and of a light brown colour, which assumes a darker shade on the head and antennæ. The thorax is furnished with three sharp teeth on each side, and each wing case has three slightly raised ribs or lines.

Fig. 22.

The larva of this insect inhabits decaying pine wood, especially pine stumps, and is supposed to be several years in completing its growth; it closely resembles the larva of its near relative, *Prionus laticollis*, shown in fig. 23 (after Riley). This latter, however, differs somewhat in its habits and appetite, seeming to prefer boring into and feeding on living roots, such as those of the Lombardy Poplar, Balm of Gilead, Apple, Pear, and especially roots of the Grape-vine; in the latter case frequently causing the sudden death of the vines attacked.

Fig. 23.



The American Silkworm (*Telea polyphemus*).

In our Report last year we gave our readers a sketch of the life history of our regal *cecropia* moth; the magnificent moth to which we now propose to refer is a fitting sequel

Fig. 24.

to that. It is, we think, one of the handsomest creatures in existence, with an expanse of wing of from five to six inches. In fig. 24 we have a representation of the male moth; fig. 25 shows that of the female.

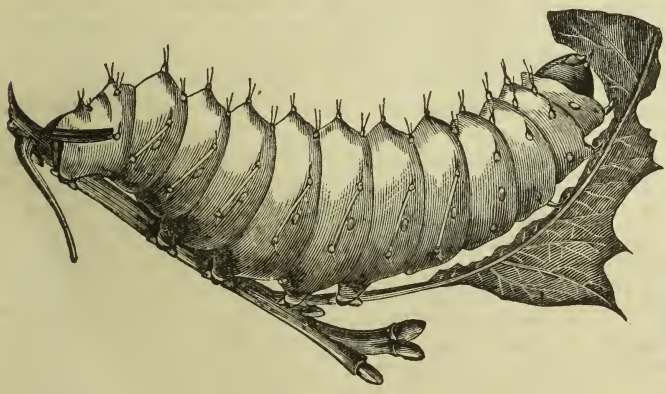
Fig. 25.

The moth is usually of a rich buff or ochre yellow colour; sometimes inclining to pale grey or cream colour; at others assuming a deeper, almost brown, colour. Towards the base of the wings they are crossed by an irregular pale white band, margined with red; towards the outer margin is a stripe of pale purplish white, bordered within by one of rich deep brown. Near the middle of each wing is a transparent eye-like spot, with a slender line across the middle; those on the front wings are largest, nearly round, margined with yellow, which is edged outside with black. On the hinder wings the spots are more eye-like in shape, are margined with yellow, with a line of black margined with blue above, and the whole set in a large oval patch of deep rich brownish black, the widest portion of the patch being above the eye spot, where also it is sprinkled with bluish

atoms. The front edge of the fore wings is grey. The antennæ in both sexes are pectinate or toothed, those of the male (which are very beautiful) being much more deeply toothed than in the female—a character by which the sexes may be readily distinguished. This lovely creature flies only at night, and when on the wing is of such a size that it is often mistaken in the dusk for a bat. When at rest, the wings are held elevated above the body, like those of a butterfly; but, if disturbed, they are spread out flat, both pairs being shown. Early in June the moths first make their appearance, and they may be found throughout that month. In a few days they pair, after which the female deposits her eggs, usually on the under side of the leaves of the oak, maple or hazel; they are generally placed singly, but occasionally two or three may be found on the same leaf.

The egg is about one-tenth of an inch in diameter, convex above and below, with the convex portions whitish and the nearly cylindrical sides brown. Mr. L. Trouvelot, of Boston, who has reared great numbers of these insects for the purpose of experimenting on the silk obtained from their cocoons, gives the result of his valuable observations in the first volume of the *American Naturalist.* He says that one hundred of the eggs, on the day they are laid, will weigh eight grains; that one hundred and ten of the empty shells weigh only one grain, and that six thousand of the newly hatched worms will weigh about one ounce. They are not long, however, in increasing their weight; in ten days they weigh ten times their weight at birth; in twenty days, sixty times; thirty days, 620 times; forty days, 1,800 times; and in fifty-six days, 4,140 times their original weight, having consumed in this period about one hundred and twenty oak leaves, weighing three-quarters of a pound.

Fig. 26.



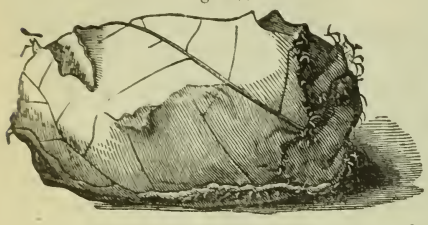
The larva when fully grown appears as represented in fig. 26; it then measures over three inches in length, with a very thick body. Mr. Trouvelot thus describes its appearance: "The head is of a light chestnut brown colour; the body of a handsome transparent light yellowish green, with seven oblique lines of a pale yellowish colour on each side of the body; the segments are each adorned with six tubercles, giving rise to a few hairs, which are tinted sometimes with orange, with a silvery spot on the middle; there are six rows of protuberances, two on the back and two on each side, and the oblique lines run between the two rows of lateral tubercles, uniting the lower one to the upper one by a yellowish line. The under side of the body is longitudinally striped with a faint yellowish band; the spiracles are of a pale orange colour, and the feet are brown. The posterior part is bordered by a purplish brown angular line similar to the letter V."

Having reached maturity the larva begins to search about with a restless air among the branches for a suitable place in which to construct its cocoon. The selection being made, "it now," says Mr. Trouvelot, "feels with its head in all directions to discover any leaves to which to attach the fibres that are to give form to the cocoon. If it finds the place suitable, it begins to wind a layer of silk around a twig, then a fibre is attached to a leaf near by, and by many times doubling this fibre and making it shorter every time, the leaf is made to approach the twig at the distance necessary to build the cocoon; two or three leaves are disposed like this one, and then fibres are spread between them in all directions, and soon the ovoid form of the cocoon distinctly appears. This seems to be the most difficult feat for the worm to accomplish, as after this the work is simply mechanical, the cocoon being made of regular layers of silk united by a gummy substance. The silk is distributed in zigzag lines of about one-eighth of an inch long. When the co-

coon is made, the worm will have moved his head to and fro, in order to distribute the silk, about two hundred and fifty-four thousand times."

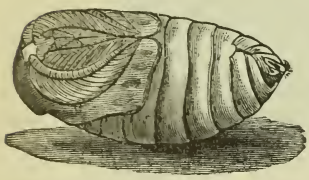
"After about half a day's work, the cocoon is so far completed that the worm can hardly be distinguished through the fine texture of the wall; then a gummy resinous substance, sometimes of a light brown colour, is spread over all the inside of the cocoon. The larva continues to work for four or five days, hardly taking a few minutes of rest, and finally another coating is spun in the interior, when the cocoon is all finished and completely air-tight." The finished cocoon is shown in fig. 27.

Fig. 27.



During this process of spinning, the larva, as might be expected, diminishes in size, which is due mainly to the enormous quantity of silk it has produced. Within two or three days after the completion of the cocoon, the worm sheds its larva skin and enters upon the chrysalis stage of its existence. The chrysalis (see fig. 28) is of a dark chestnut brown colour, its hind segment being armed with a small brush-like cluster of hooks. Through the anterior segments the antennæ, and —on a diminutive scale—the wings of the future moth may be clearly seen. In this condition the insect passes the winter, emerging as a moth in the following June.

Fig. 28.



This insect, especially in the larval state, is subject to the attack of many foes. It has been estimated that ninety per cent. and upwards of the larva fall a prey to insectivorous birds; the thrushes, catbirds and orioles are said to be especially active in this department. They also have their insect enemies. Besides the ordinary run of spiders, bugs, wasps, &c., they have a special and most dangerous foe in a species of Ichneumon fly, known as *Ophion macrurum* (fig. 29). This active creature may often be seen in summer flying about, searching among the leaves of shrubs and trees for her lawful prey; having found the object of her search, she watches her opportunity to place quickly upon the skin of her victim a small oval white egg. This process is repeated until some eight or ten eggs are placed, each one securely fastened by a small quantity of a glutinous substance attached to it for this purpose by the Ichneumon. In a few days these eggs hatch, when the tiny worms pierce through the skin of the caterpillar, and commence to feed on the fatty portions within. The caterpillar continues to grow, and usually lives long enough to make its cocoon, when it dies; and in the following summer, in place of the moth there issues its enemy, the Ichneumon parasite.

Fig. 29.

ON SOME OF OUR COMMON INSECTS.

By R. V. Rogers, Kingston, Ont.

The Luna Moth (*Actias luna*, Linn.)

If any of the insect host is a proof of high art in nature, and of the beauty of the Creator's thoughts, it is most assuredly the fair creature whose name is mentioned above. Allied to families whose members are among the greatest of the insect world, and having cousins and connections surpassing in size and beauty all others of their kingdom in this Dominion, still this moth is as pre-eminent above its fellows as is its namesake—the fair empress of the sky—above the lesser lights that rule the night.

So conspicuous is the Luna in her royal robes that she has a right to feel slighted at being thus long almost unnoticed in the pages of the Entomologist, and now it is hard upon her to be described among "Some of our Common Insects;" but blue blood always tells, and queenly grace and beauty will ever distinguish the Luna from among the *profanum vulgus* of the Articulata.

And now for a biographical sketch of this beauty from the cradle to the grave, and beyond that, after it assumes the resurrection attire, to that day when, its work accomplished, it lays itself down that its body may mingle again with its parent dust.

The eggs, which are more than one hundred in number, are of a dark brown or chocolate colour, smooth and .005 of an inch in length; the sides are flattened and of a lighter shade. In a fortnight the little larvæ begin to appear, making their escape into the outer world by eating an oval opening in the end of the shell. Now one can see that the inner surface of the egg is perfectly white. The little wriggling caterpillars, when they first emerge, are about .02 of an inch in length, and exhibit a black head, greenish on top and yellowish in front; a body black, adorned with two yellow spots on each segment, and decorated with numerous yellow hairs; the under part of the body and feet are of a light yellow. Some crawl about with the empty shell on their tails, others carry it as an umbrella over their heads, but the majority seem to discard it at once, as their human superiors do a friend from whom nothing more is to be expected. Some that I attempted to bring up by the hand, without the assistance of that most careful of mothers, Dame Nature, had in a week grown over a third of an inch in length, and showed the warts crowned with little hairs on each segment. In ten days they began to change their skin, having eaten so much that their first clothes had become too tight for them. Now they showed a head and body of light green, with yellow knobs on each segment: the hairy appendages were not so numerous or distinct as before, and a few of those on the front segments were dark. In a fortnight from its birth the largest one was nearly half an inch long, and when they had been in the land of the living for a month they were nearly an inch in length. When fully grown the head of the caterpillar is nearly elliptical in shape, and of a pearl colour; the rest is of a delicate pale and very clear bluish-green colour. A very pale yellow stripe extends along each side of the body, from the first to the tenth segment, just below the line of the spiracles; and the back is crossed, between the rings, by narrow transverse lines of the same colour. After the manner of its kith and kin, each segment is adorned with small pearly warts—tinged with purple—five or six in number, each furnished with a few little hairs. At the end of the tail are three brown spots, edged above with yellow.

When at rest, this magnificent caterpillar (which, by the way, is very similar to that of its congener, *Telea polyphemus*, save that the latter is destitute of the lateral yellow stripe, and the bands between the segments, the tail being bordered by a brown V-shaped mark) is nearly as thick as a man's thumb; its rings being bunched and body shortened, the length is only about two inches, but when it sets out on its travels, it stretches itself

to about three inches. In the CANADIAN ENTOMOLOGIST (vol. vi., p. 86) Mr. Gentry describes an interesting va..ety in which the general colour is a dull reddish brown; the lateral and transverse stripes of yellow have vanished, the abdominal spots shine conspicuously, but without the yellow edging; the pearl-coloured warts with their purple edge have, however, assumed a richer hue, and blaze like a coronet of rubies.

When the larva has passed its allotted days in eating the leaves of the hickory,beech, oak or walnut, and is thinking seriously of preparing its silken shroud and the casket in which it is to lie until its resurrection morn, it casts about and draws together two or three leaves of a tree, and within this hollow spins an oval and very close and strong cocoon of whitish silk. It is about 1¾ inches in length, of a chestnut brown on the outside; very thin, and frequently rough on the surface; covered with warts and excrescences, but seldom showing the print of leaves. Harris says that the cocoons are formed on the trees, and that they fall to earth with the leaves shaken off by autumnal gales; but other observers assert that the larva crawls to the ground just before its change, and there prepares for its future transformations.

In this state, too, the Luna greatly resembles the Polyphemus, and many a collector having—after careful searching—got together a fair supply of what he deems Luna chrysalids, is greatly chagrined by finding dusky, one-eyed giant Polyphemi issue from the silken tombs, instead of a bright throng of empresses of the night in their delicate bridal attire. The Polyphemus cocoons are, however, white or dirty white; rather smaller than the Lunas, with rounded ends; sometimes angular, because of leaves moulded unevenly into the surface, and generally coated with a white powder.

About the month of June the Lunas awake from their long and death-like sleep, burst asunder their cerements—having first loosened the compact threads by ejecting a liquid—and issue forth in all their glory, no more to be mistaken for the sober one-eyed Cyclopeans, but resplendent in gay attire. The wings, which expand from 4¾ to 5½ inches, are of a delicate light green colour, and the hinder ones are each prolonged into a tail of an inch and a half or more in length—longer, indeed,than those of the day-flying Papilios. Along the front edge of the fore wings is a broad purple-brown stripe, extending also across the thorax, and sending backwards a little branch to a glittering, eye-like spot near the middle of the wing. These eyes (of which there is one on each of the wings) are transparent in the centre, and encircled by rings of white, yellow, blue and black. The hinder borders are more or less edged with purple brown. All the nervures are very distinct and pale brown. Near the body the wings are densely covered with hairs. The under sides are similar to the upper, except that an indistinct undulating line runs along the margin of both wings.

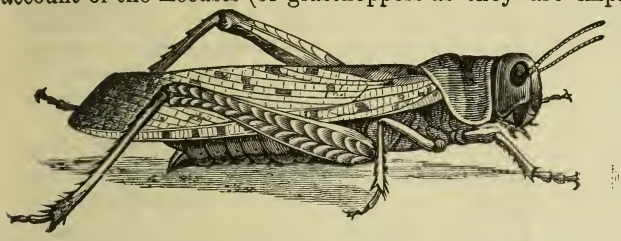
As for the body that bears these lovely appendages, the thorax is white, sometimes yellowish or greenish, crossed by the purple-brown stripe that traverses the whole length of the upper edge of the front wings; the abdomen is of the same colour as the thorax, and covered with white hairs like wool. The head is white and small, and adorned with wide, flat and strongly pectinated antennæ of a brownish tinge. The legs are purple-brown.

Such is Luna in her various transformations to outward appearance; notwithstanding her size and loveliness, her habits and peculiar instincts are not very noteworthy. The gift of superior beauty, as among the highest of animals so in the insect world, is not frequently accompanied by remarkable intelligence or superior sense; and the most gaudy butterfly or moth is a fool in comparison with the dingy-coloured bee. The caterpillars of butterflies and moths have some various instincts—chiefly in the direction of silk spinning and sepulchre building—but the perfect insects only live "to increase and multiply their race, and embellish nature. Their existence in the perfect state is usually very brief; it is one of the prettiest of honeymoons, and often love subdues and destroys every other passion. The gourmandizing caterpillar is never troubled by the ardent flame which consumes even the thought of sipping the nectar of the flowers that rival in beauty the wings of the perfect representation of elegance and love. The early insect lives and eats, and the perfect form lives and dies."

THE WESTERN LOCUSTS.

BY THE REV. C. J. S. BETHUNE.

In our last Annual Report (1874) we devoted a considerable portion of our space to an account of the Locusts (or grasshoppers as they are improperly termed), which were so destructive that year throughout large tracts of country in Manitoba and the neighbouring regions of British America, and in many of the States between the Rocky Mountains and the Mississippi River. We now propose to supplement that account by information that we have gleaned from various sources, and that, we trust, will prove interesting to the reader.



During the present year (1875) it is cheering to find that the extent of the plague has been very much diminished, and that many portions of the West are rapidly recovering from the devastation and suffering of the previous year. In the Province of Manitoba, where very serious havoc has been committed by the insect, there are this year many localities where the injury is but trifling. To quote a correspondent of the Toronto *Globe* (October 30, 1875)—"No better wheat and potatoes can anywhere be found than were lately harvested at Portage La Prairie and along the Red River between Fort Garry and Pembina, and in the neighbourhood of St. John. All this is spring-sown, in rich, well-drained land. Efforts in the infested regions, made by settlers and their families during the few hours in which the locust rested, such as building fires, surrounding the field or garden with a ditch into which the insects fall and drown, beating them with bushes, &c., have been successful in saving large parts of the crops." On the other hand, he states: "Many of the farmers this year let their fields go waste rather than plant for the locusts to eat, as they had done for two years. In the gardens of Government House and of the Penitentiary, in the old field at Kildonan, and along the banks of both rivers, we saw the effects of the ravages. The garden of Deer Lodge was destroyed in a few hours." With regard to the future he adds: "It is generally hoped that but little of this plague will be felt for some years in Manitoba. The grounds for such confidence are the historical facts as to its periodicity, the great numbers of the parasites found on the specimens examined, and the fact that the locusts flew off without depositing their eggs. In lands where nature has dealt with less lavish hand the farmer might well hesitate to embark his means and labour in tillage; but the great returns which the marvellously rich, deep soil of this Province will yearly produce, will doubtless allow an ample margin for periodical losses from this plague, and these losses too may be anticipated, and to a great extent met and lessened, by united skilful effort when the lands become settled, as no doubt they soon will be, with industrious farmers using all modern means of agriculture."

Another writer in the same newspaper (Mr. J. M. Machar—*Daily Globe*, Dec. 18, 1875) gives the following information respecting Manitoba:—"Between the Assiniboine and the southern shore of Lake Manitoba there lies a district of about ten miles square, chiefly settled and farmed by emigrants from Ontario. These farmers have harvested, in spite of the grasshoppers, a two-thirds crop, which is better than an average crop in Ontario. Instead of sowing nothing, as did many of their neighbours in the parishes of Baie St. Paul and Francois Xavier, or watching the grasshoppers devour what they had sown, as did most of the others, these brave men sowed in hope, and when the enemy appeared, turned out and fought him. I saw a forty-acre field of splendid wheat at Port-

age Creek, which had been saved by spreading a swathe of straw across the middle of the field; then the whole family armed themselves with boughs, and forming line drove the grasshoppers before them into the straw. When evening came a match was applied, and in five minutes nothing was left of the invaders but their horny coverings, which, at the time of my visit in August, still littered the ground in millions."

THE LOCUSTS IN THE WESTERN STATES.

Throughout the Western States that lie beyond the Mississippi River, where last year fully one hundred thousand people were estimated to have been seriously affected by the plague of locusts—many being reduced to poverty and starvation—this year the actual suffering has been comparatively slight. From the official reports of the Department of Agriculture at Washington, we gather that the dreaded locust "seems to be perishing from the assaults of parasites; its demonstrations of destructive power were far less formidable than last year." In the early part of the season very serious apprehensions were felt as to the safety of the crops in many localities, but as the summer advanced it was found that though much injury was inflicted in particular places, there was no such wide-spread havoc as in the preceding year.

In the "Monthly Report" for May and June, for instance, it is stated that "The destructive locust, *Caloptenus spretus*, has recommenced its depredations west of the line of the Missouri, and in some counties to the east of that river. It was reported that they were hatching in immense numbers in five of the counties of Minnesota. In some cases they were burned in great numbers in piles of straw. In Missouri they were very destructive in the north-western part of Vernon County; in Platte they swept all the grain and grass crops; they were also a terrible scourge in five other counties. (All of these suffered severely last year—they lie along the western boundary of the State.) In Kansas they had eaten all the stacked tame-grass hay and all the old meadows, twenty-five per cent. of the wheat, and most of the growing corn-plants; in Marshall County they destroyed wheat, oats and gardens; Leavenworth records the most terrible visitation yet known—the popular dismay is indescribable. Similar reports come from seventeen other counties. In some villages the streets are covered with these insects. Fruit-trees have in many cases failed to bear, from the fact that they were last year deprived of all their foliage and young-wood growth by these pests. From some counties come bitter complaints of the falsehoods of newspaper writers and others, palliating or denying the real extent of the disasters. These false representations are made in the interest of speculative property-holders, who fear a depreciation of their investments. In a few counties the injuries have as yet been small, but all such places are yet liable to destructive visitation. The cotton-plant was especially relished by these insects. In Nebraska they had destroyed twenty per cent. of the small grain, and were still at work. In Colorado they were numerous and destructive in three counties."

In the *Prairie Farmer* of the 29th of May it is stated that "the reports from the grasshopper regions of Missouri, Kansas and Nebraska are somewhat conflicting, yet on the whole a little more cheerful from many localities than they were last week. From Sedalia, Missouri, comes an account of three deaths from starvation. At a meeting held at Jefferson City, it was stated that suffering in many parts of the State was imminent, and it was resolved that the Governor should appoint commissioners in every county of the State to solicit relief, and that collections for the sufferers should be taken up in all the churches on the Fast Day, June 3rd." This 'Fast Day' was appointed by proclamation of the Governor of the State of Missouri, as a day of fasting and prayer to Almighty God for deliverance from the plague of locusts, and was, on the whole, very religiously observed throughout the State.

The same paper quoted above relates further that the ravages still continue in the neighbourhood of St. Joseph. "The feeling regarding them varies with localities; some are despondent, while others think the damage will be light. The people of Nebraska generally are reported to be very hopeful; they believe that the entire corn crop at least will be saved. They have developed in patches, but are doing less harm than was anticipated."

In the next issue of the *Prairie Farmer* (June 5th) a further account is given of the locust ravages, as follows :—

" Though in many localities the locusts have begun to try their wings, they do not yet seem ready for a prolonged or general flight. They seem to fly short distances in all directions, though we hear little of encroachments on new ground to the eastward. A few days more will settle the question as to direction and probable damage. All we know now is that in Missouri there is already considerable suffering among the people. A meeting was held at Independence on the 31st. From all portions of the county there came sad accounts of suffering. A relief committee was appointed. From Lexington we hear that the locusts are still at work, with no immediate prospect of leaving. A committee for relief purposes has been appointed. At Fort Scott, Kansas, the pests are reported as on the wing for the north-west. At Olathe they are moving northward. We have few particulars from Nebraska, but from what we do hear, conclude that there is little cause for alarm. The same may be said of Minnesota. In Nebraska, however, there is developing disease among the people, resulting from the privations of the past few months. Scurvy prevails to a considerable extent."

The July " Monthly Report of the Department of Agriculture " at Washington gives a record of the plague of locusts, from which we gather the following :—

" They appeared in several counties of Minnesota. Blue earth offered a bounty for their destruction. About 20,000 bushels were collected and destroyed at a cost of $32,000, without perceptibly diminishing their numbers." They were very destructive in three other counties, but were comparatively innocuous in the rest from which reports had come. In Iowa, Montgomery County had a very destructive visitation in the western part, the greatest injury being to the corn crop. They are also noted in eight other counties. In Missouri they did serious damage in several of the counties mentioned in the preceding month's report. " They swept away all the crops in Clay County ; in Carroll they chewed tobacco." In Texas they were injurious to the cotton-plant. In Kansas they inflicted a very serious amount of damage ; in three counties, three-fourths of the crops were destroyed ; they were " very bad " in fourteen more counties ; while lighter visitations were reported from six others. In Nebraska they are reported as more or less injurious in thirteen counties.

After this the various records show a brighter state of things, the numerous ravages already referred to proving, in many instances, much less serious than was at first apprehended. A correspondent of the *Prairie Farmer*, writing from Johnson County, Nebraska, on the 29th of July, states that " the grasshoppers hatched and commenced eating the wheat on April 28th, and stayed with us until June 13th. They commenced flying when the wind was north-west, and continued to fly up to the 27th of June—some days partly in clouds that could be seen when three miles off, but they did not light much in our county. As to wheat, there may be one-third of a crop of inferior quality, but potatoes and grass never looked better. If nothing happens to the corn, it will be the largest crop raised in the county." Another correspondent from the same State, writing a fortnight later, says : " We have splendid prospects for crops of all kinds planted since the grasshoppers left. Most of our small grain has been harvested, threshed and marketed by the grasshoppers, and so far we have not received any returns ; but we have the best prairie grass I ever saw. If the frost holds off as late as usual, we shall have a large quantity of corn and buckwheat." The " Monthly Report " from Washington, for August and September, mentions locust ravages in a few counties of the States of Minnesota, Iowa, Missouri, Kansas and Nebraska, but notices a great decrease in the reported devastations. " The pest," it states, " is evidently declining very fast, and the earnest hopes of a cessation of their ravages expressed by our correspondents appear to have a solid foundation in facts." The very perceptible reduction in the extent of the plague is attributed to the immense development of parasites upon the bodies of the locusts. The reports for the three remaining months of the year all show that " the plague was stayed " before it caused the utter ruin that was so widespread during the previous year. To give a few instances out of many :—A writer from Minnesota says, " I cannot report in comparison with last year, as we then produced nothing of any account, owing to destruction by grasshoppers. This year all kinds of crops raised here are generally good. The end of the season finds the farmers in better condition than for three or four years." Another from Clay County,

Missouri, writes: "Since the destruction by the grasshoppers, crops of all kinds have grown beyond precedent as to quantity and quality. Food for stock is abundant, and pastures abound with rye instead of blue-grass." A third, from Kansas, the State that has suffered most of all from the locusts, states that "the failure of wheat, oats, timothy, clover, flax, &c., by ravages of the grasshopper, caused the planting of an extraordinary breadth of corn, potatoes, beans, buckwheat and vines of all kinds. Then the finest season for the growth of these crops has brought our farmers bountiful harvests of them." Others from different parts of the same State write: "Last year we had almost nothing; this year we have great abundance." "All our crops were destroyed last year, while this year they are all good." "Last season we had nothing worth noting; this season our crops are large beyond any precedent." From Nebraska, it is reported that "neither corn nor potatoes were raised last year; the whole crops were destroyed by grasshoppers; this season we have the best crops ever raised."

From the foregoing Reports it is evident that the locust visitation of this year, though very alarming in the earlier portion of the season, has proved to be of only moderate importance. No doubt there have been here and there, in the infested region, individual cases of extreme suffering, but the general population have escaped without any serious hardship. Where the invading horde of locusts makes but one attack, there is no doubt that it can be repelled and got rid of by vigorous efforts, especially if the population is sufficiently dense to admit of concerted action over a considerable area; but, on the whole, it is apparent that natural causes alone have operated in the reduction of the great army, and that no human measures have had any appreciable effect in averting a repetition of the frightful sufferings of the ever memorable "Locust Year," 1874.

Means of Reducing the Ravages of the Locusts.

In our Report of last year we gave an account of various methods that may be employed in the reduction of the ravages of the locusts; since its publication much has been said and written in different quarters upon the same subject, as, from the vast amount of devastation caused by the insect, it had become a matter of supreme importance to the people of the whole continent, whether personally affected or not. Naturally, therefore, the subject came up for discussion at the meeting of the American Association for the Advancement of Science, held at Detroit in August last. Papers were there read by Dr. LeConte, of Philadelphia, retiring President of the Association, the most eminent of American Entomologists, and Professor Riley, the State Entomologist of Missouri, who has made the locusts a subject of personal study since their appearance in his State. As Dr. LeConte's paper has already been quoted by Mr. Saunders in the earlier portion of this Report, we need only desire the reader to refer to it there.

From Professor Riley's paper, which was of considerable length, we make the following quotations, which the reader will observe set forth for the most part similar modes of prevention to those briefly suggested by us in our last Report (pages 40 and 41):—

"The means to be employed against the ravages of the locust in the more fertile country subject to its periodical visitations, but in which it is not indigenous, may be classed under five heads:—1. Natural agencies. 2. Artificial means of destroying the eggs. 3. Means of destroying the unfledged young. 4. Remedies against the mature or winged insects. 5. Prevention.

"1. *Natural Agencies.*—These are, 1st., climatic conditions which induce disease and prevent the insect's continued multiplication in much of the country it invades. 2nd. Natural enemies, consisting of birds, reptiles and mammals which devour, or in other ways destroy it, and of predaceous and parasitic species of its own class. The agencies in the first and last categories are beyond man's control, and will do their appointed work uninfluenced by his action; but the others are more within his control. Almost all birds inhabiting the western plains feed upon the locust and its eggs, and the prairie chicken and quail are untiring in this good work. The States subject to locust ravages should pass more stringent laws for the better protection of these game birds, with which the markets of the East are annually glutted. Many of the harmless reptiles—toads, snakes and lizards—should be spared from the ruthless war which most persons, ignorant of their habits, wage against them.

"2. *Artificial means of destroying the Eggs.*—The fact that man can accomplish most in his warfare against locusts by destroying the eggs, has long been recognised by European and Asiatic Governments liable to suffer from the insects. The eggs are laid in masses, just beneath the surface of the ground, seldom to a greater depth than an inch; and high, dry ground is preferred for the purpose. Very often the ground is so completely filled with these egg-masses, that not a spoonful of the soil can be turned up without exposing them, and a harrowing, or shallow ploughing, will cause the surface to look quite whitish as the masses break up and bleach from exposure to the atmosphere. Great numbers will be destroyed by such harrowing or ploughing, as they are not only thereby more exposed to the attacks of natural enemies, but they lose vitality through the bleaching and desiccating influence of the dew, and rain and sun. If deeply turned under by the plough, many of them will rot, and the young that chance to hatch will come forth too late the next year to do much harm—providing the same ground be not re-turned so as to bring the eggs to the surface in the spring. Excess of moisture for a few days is fatal to the eggs, and they may very easily be destroyed where irrigation is practicable. Where stock can be confined and fed on soil filled with such eggs, many of these will be destroyed by the trampling. All these means are obviously insufficient, however, for the reason that the eggs are too often placed where none of them can be employed. In such cases they should be collected and destroyed by the inhabitants, and the State should offer some inducement in the way of bounty for such collection and destruction. Every bushel of eggs destroyed is equivalent to a hundred acres of corn saved, and when we consider the amount of destitution caused in some of the Western States by the locust invasion of 1874, and that in many sections the ground was known to be filled with eggs—that, in other words, the earth was sown with the seeds of future destruction—it is surprising that the Legislatures of those States did not make some effort to avert future injury by offering a liberal price per bushel for the eggs. A few thousand dollars taken out of the State treasury for this purpose would be well spent, and be distributed among the very people most in need of assistance.

"3. *Destruction of the Unfledged Young.*—As I have stated in the articles already alluded to, heavy rolling, where the surface of the soil is sufficiently firm, destroys the larger portion of them, but is most advantageously employed when the insects are most sluggish. They drive almost as readily as sheep, and may be burned in large quantities by being driven into windrows or piles of burning hay or straw. But the experience of the present year convinces me that by far the most effectual way for man to protect his crops and do battle to these young locust armies—especially where, as in West Missouri, this spring, there was no hay or straw to burn—is by ditching. A ditch two feet wide and two feet deep, with perpendicular sides, offers an effectual barrier to the young insects. They tumble into it and accumulate, and die at the bottom in large quantities. In a few days the stench becomes great, and necessitates the covering up of the mass. In order to keep the main ditch open, therefore, it is best to dig pits or deeper side ditches at short intervals, into which the hoppers will accumulate, and may be buried. We hear much talk about the powerlessness of man before this mighty locust plague; but I am quite confident that here we have a remedy that is at once thorough and effectual, whereby the people of some of the States, at least, may avert in future such evil as that which befel them this spring. There have been a number of partial attempts at ditching by simply turning a couple of furrows with the plough. Even these will often divert the encroaching insects from their course; but they can never be relied on, and you may rest assured that whenever you hear a man declare that ditching is no protection, he refers to such slovenly half-made ditches. No instance has come to my knowledge where a ditch, such as I first described, has failed to effectually keep off the insects. Made around a field about hatching time, no hoppers will get into that field till they acquire wings, and by that time the principal danger is over, and the insects are fast disappearing. If any should hatch within the inclosure, they are easily driven into the ditches dug in different parts of the field.

"There are various other ways of catching and destroying the young locusts, as driving them into converging barriers by means of ropes dragged on the ground, with a person at each end, and then crushing them with shovels or burning them by means of torches made of rags and dipped in coal oil and attached to sticks; catching them with nets, &c.; but nothing

equals ditching. As for protecting plants by the application of powders and liquids, I have come to the conclusion that it is out of the question.

"If the eggs are duly destroyed, there will be no trouble from the young locusts; but where these once abound, pecuniary inducement to collect and kill them should be offered by the State. It is one of the best means of giving aid and employment to the sufferers, who cannot pursue their ordinary avocations till the plague measurably leaves or is banished.

"In this connection I would also urge the employment of military force, a large amount of which, in times of peace, could be ordered into the field at short notice.

"To many, the idea of employing soldiers to assist the agriculturist in battling with this pest may seem amusing and farcical enough, but though the men might not find glory in the fight, the war—unlike most other wars—could only be fraught with good consequences to mankind. In Algeria, the custom prevails of sending the soldiers against these insects. While recently in the south of France, I found, to my great satisfaction, that at Arles, Bouche du Rhone, where the unfledged locusts (*Caloptenus Italicus*, a species closely allied to the Rocky Mountain locust) were doing great harm, the soldiers had been sent in force to battle with them, and were then and there waging a vigorous war against the tiny foes. A few regiments, armed with no more deadly weapon than the common spade, sent out to the suffering parts of Missouri, Kansas and Nebraska last spring, might, in a few weeks, have entirely routed this pygmean army, and materially assisted the farmer in his ditching operations.

"A few other suggestions, and I will dismiss this part of the subject. Hogs and poultry of every description delight to feed on the young hoppers, and will flourish where these abound when nothing else does. It will be well, in the event of a future invasion, for the people in the invaded districts to provide themselves with as large a quantity as possible of this kind of stock. Where no general and systematic efforts were made to destroy either the eggs or the young locusts, and it is found that, as spring opens, these young hatch out in threatening numbers, the intelligent farmer will delay the planting of everything that he cannot protect by ditching, until the very last moment, or till toward the end of June—using his team and time solely in the preparation of his land. In this way he will not only save his seed and the labour of planting, and, perhaps, replanting, but he will materially assist in weakening the devouring armies. Men planted this spring and worked with a will and energy born of necessity, only to see their crops finally taken, their seed gone, and their teams and themselves worn out. The locusts finally devoured every green thing, until, finding nothing more, they began to fall upon each other and to perish. This critical period in their history would have been brought about much earlier if they had not had the cultivated crops to feed upon; and if by concert of action this system of non-planting could at first have been adopted over large areas, the insects would have been much sooner starved out and obliged to congregate in the pastures, prairies and timber. Moreover, the time required for early planting and cultivating, if devoted to destroying the insects after the bulk of them hatch out toward the end of April, would virtually annihilate them.

"4. *Destruction of Winged Insects.*—Man is comparatively powerless before the vast swarms that wing their way from their native breeding places, and this part of the subject may be passed over in this connection.

"5. *Prevention.*—What I have so far said is, perhaps, of more interest to the farmer than to the members of this association; but in dealing with the fifth mode of counteracting the injuries of the Rocky Mountain locust, I appeal more especially to your wisdom and judgment. Prevention, in dealing with insect ravages, is always better than cure. 'A little fire is quickly trodden out, which, being suffered, rivers cannot quench.' The proper way to deal with this insect is to attack it in its native breeding places.

"In my seventh Report I have shown that the insect is not autochthonous in much of the more fertile country it devastates, and that it never extends east of the 17th meridian. I have also given reasons for believing that the swarms from which we most suffer originate in the Rocky Mountain regions of Dakota, Wyoming, Montana and British America. Our efforts should be directed to its restriction within its natural limits.

"In conclusion, the most important results are likely to flow from a thorough study of the Rocky Mountain locust in its native haunts and breeding places. By learning just when and how to strike the insect, so as to prevent its undue multiplication there—whether by some more extensive system of irrigation, based on improved knowledge of the topography and water supply of the country, or by other means of destroying the eggs—we

may hope to prevent the fertile States to the east from future calamity. This knowledge can never be acquired by any single individual. The subject is of national importance, and should receive the consideration of the National Government. It is not merely the question of saving to the nation, in future, such vast sums of money as this insect has filched from the producers of some of the Western States (amounting during the past three years to many millions of dollars); it is a question affecting the welfare of the whole commonwealth on the other side of the Mississippi, and the ultimate settlement of a vast tract of country extending from the base of the Rocky Mountains eastward, to which settlement the ravages of the locust in question offer the most serious obstacle."

We have quoted somewhat fully from Prof. Riley's paper, as almost every word of it is just as applicable to the Dominion of Canada and the Province of Manitoba as to the United States and the State of Missouri.

As a result of the papers of Messrs. LeConte and Riley, the standing Committee of the American Association authorized the circulation, for the signatures of members, of a memorial to the Congress of the United States; we understand that it was signed by many most influential and distinguished members.

The text of the memorial will be found in the introductory portion of this report.

Should the Congress of the United States accede to the prayer of this memorial, as we trust they will, it is earnestly to be hoped that the Legislature of the Dominion will appoint a similar Commission, to co-operate with that of our neighbours in all matters that concern vast areas of the continent, and not merely particular localities. In the case of the locust, it is evident that an exploration of the British American portion of the Rocky Mountains lying between the 49th and 51st parallels of latitude, if not somewhat further to the north as well, is urgently needed with a view to the discovery of the native haunts of the insect, or at any rate to the settlement of the question whether it breeds within the limits of our country or not. Much indeed might be done by the addition of a competent entomologist to the staff of the various surveying parties that are from time to time sent out for the settlement of boundaries, and the surveying of railway routes. Should it be discovered that the locusts do deposit their eggs and come to maturity year after year in any special locality on the eastern slope of the Rocky Mountains, then it would be a wise expenditure of public money to send a properly equipped party to the haunt of the enemy, and strive by every means to accomplish his extermination. The expenses of such a force would be a thousand times repaid by the saving of the crops and fruits of the farmers of Manitoba, and by the removal of what is felt by many to be a serious drawback to the settlement of the Province. Should our neighbours, however, south of the 49th parallel, not unite in the endeavour to keep the enemy in control, any labour on our part would be of little avail. Just as a farmer cannot hope to exterminate the thistles from his fields, if those about him allow the weed to scatter its seeds with every wind that blows; so we cannot hope to free our own territory from recurring plagues of locusts, if the Government of the United States do not join with us in the work. In any case, however, it will be wise to lose no time in discovering, by careful exploration, whether the insect is indigenous to British America or not. The settlement of this point will be one great step towards the accomplishment of an efficient protection against future invasions.

Since the above was written we learn that a Bill has been introduced into the Senate of the United States by the Hon. Mr. Ingalls, for the Protection of Agriculture, and that it has been received and referred to a Committee. In the introduction of the Bill especial reference was made to the depredations of locusts, chinch-bugs, army-worms, cotton-worms, the Hessian fly, &c. It was stated that the farmers of the United States are estimated to have suffered a loss last year of $200,000,000 by these insects, and that $40,000,000 would hardly cover the loss by locusts alone; it was further declared that in seven counties of Minnesota $80,000 were expended in destroying 60,00 bushels of locusts.

The Bill authorizes the Secretary of the Interior to appoint, upon the nomination of the National Academy of Sciences, a Commission, to consist of three eminent entomologists, to serve five years, at a salary of $5,000 per annum each, and to be allowed travelling expenses, &c. They are to devote themselves to the investigation of insects most injurious to the great staples, especially the Rocky Mountain locust, the army-worm, chinch-bug, Hessian fly and cotton-worm. The results of their labours are to be reported to Congress at least once a year.

It is evident that the memorial of the American Association, referred to above, has already produced an effect upon the Legislature of the United States. We have little doubt that the Bill, with perhaps some slight modifications, will be passed by Congress; and we have equally little doubt that, if the work is entrusted to the right men, we shall soon observe some very important results, that will speedily repay the nation many times over for any expenditure that may be incurred. We trust now that the matter will be brought before the consideration of the Legislature of the Dominion, in order that there may be the fullest co-operation with the work on the other side of the line.

Locusts as an Article of Food.

The use of locusts as an article of food was referred to in our last Report, where, after mentioning various instances in which different species of the insect have been made use of in this way in many parts of the world, we stated that "it remains to be proved that a nutritious article of food may not be obtained from the Rocky Mountain locust (*Caloptenus spretus*); certainly it is an experiment worth trying; if successful we should have a double benefit—the lessening of the numbers of the locusts and the supply of food wherewith to meet the famine that they have produced." We are glad to find that our friend, Professor Riley, who has had excellent opportunities for the purpose, has made the experiment with decided success. From his paper on the subject, read before the American Association, we make the following extracts:—

"Whenever the occasion presented, I partook of locusts prepared in different ways, and one day I ate of no other kind of food, and must have consumed, in one form and another, the substance of several thousand half-grown locusts. Commencing the experiments with some misgivings, and fully expecting to have to overcome disagreeable flavour, I was soon most agreeably surprised to find that the insects were quite palatable, in whatever way prepared. The flavour of the raw locust is most strong and disagreeable; but that of the cooked insects is agreeable, and sufficiently mild to be easily neutralized by anything with which they may be mixed, and to admit of easy disguise, according to taste or fancy. But the great point I would make in their favour is, that they need no elaborate preparation or seasoning. They require no disguise, and herein lies their value in exceptional emergencies; for when people are driven to the point of starvation by these ravenous pests, it follows that all other food is either very scarce or unattainable. A broth, made by boiling the unfledged *Calopteni* for two hours in the proper quantity of water, and seasoned with nothing in the world but pepper and salt, is quite palatable, and can scarcely be distinguished from beef broth, though it has a slight flavour peculiar to it and not easily described. The addition of a little butter improves it, and the flavour can, of course, be modified with mint, sage and other spices, *ad libitum.* Fried or roasted in nothing but their own oil, with the addition of a little salt, they are by no means unpleasant eating, and have quite a nutty flavour. In fact it is a flavour, like most peculiar and not unpleasant flavours, that one can soon learn to get fond of. Prepared in this manner, ground and compressed, they would doubtless keep for a long time. Yet their consumption in large quantities in this form would not, I think, prove as wholesome as when made into soup or broth; for I found the chitinous covering and the corneous parts, especially the spines on the tibiæ, dry and chippy, and somewhat irritating to the throat. This objection would not apply with the same force to the mature individuals, especially of larger species, where the heads, legs and wings are carefully separated before cooking; and, in fact, some of the mature insects prepared in this way, then boiled and afterward stewed with a few vegetables and a little butter, pepper, salt and vinegar, made an excellent fricassee.

"Lest it be presumed that these opinions result from an unnatural palate, or from mere individual taste, let me add that I took pains to get the opinions of many other persons. Indeed, I shall not soon forget the experience of my first culinary effort in this line—so fraught with fear and so forcibly illustrating the power of example in overcoming prejudice. This attempt was made at an hotel. At first it was impossible to get any assistance from the followers of the *ars coquinaria.* They could not have more flatly refused to touch, taste or handle, had it been a question of cooking vipers. Nor love nor money could induce them to do either, and in this respect the folks of the kitchen were all

alike, without distinction of colour. There was no other resource than to turn cook myself and operations once commenced, the interest and aid of a brother naturalist and two intelligent ladies were soon enlisted. It was most amusing to note how, as the rather savoury and pleasant odour went up from the cooking dishes, the expression of horror and disgust gradually vanished from the faces of the curious lookers-on, and how, at last, the head cook—a stout and jolly negress—took part in the operations; how, when the different dishes were neatly served upon the table and were freely partaken of with evident relish and many expressions of surprise and satisfaction by the ladies and gentlemen interested, this same cook was actually induced to try them and soon grew eloquent in their favour; how, finally, a prominent banker, as also one of the editors of the town, joined in the meal. The soup soon vanished and banished silly prejudice; then cakes with batter enough to hold the locusts together disappeared and were pronounced good; then baked locusts with or without condiments; and when the meal was completed with dessert of baked locusts and honey *à la* John the Baptist, the opinion was unanimous that that distinguished prophet no longer deserved our sympathy, and that he had not fared badly on his diet in the wilderness. Prof. H. H. Straight, of the Warrensburg (Mo.) Normal School, who made some experiments for me in this line, wrote: 'We boiled them rather slowly for three or four hours, seasoned the fluid with a little butter, salt and pepper and it made an *excellent* soup, *actually;* would like to have it even in prosperous times. Mrs. Johonnot, who is sick, and Prof. Johonnot pronounced it excellent.'

"I sent a bushel of the scalded insects to Mr. Jno. Bonnet, one of the oldest and best known caterers of St. Louis. Master of the mysteries of the cuisine, he made a soup which was really delicious and was so pronounced by dozens of prominent St. Louisans who tried it. Shaw, in his *Travels in Barbary* (Oxford, England, 1738), in which two pages are devoted to a description of the ravages of locusts, mentions that they are sprinkled with salt and fried, when they taste like craw-fish; and Mr. Bonnet declared that this locust soup reminded him of nothing so much as crawfish bisque, which is so highly esteemed by connoisseurs. He also declared that he would gladly have it on his bill of fare every day if he could get the insects. His method of preparation was to boil on a brisk fire, having previously seasoned them with salt, pepper and grated nutmeg, the whole being occasionally stirred. When cooked they are pounded in a mortar with bread fried brown, or a puree of rice. They are then replaced in the saucepan and thickened to a broth by placing on a warm part of the stove, but not allowed to boil. For use, the broth is passed through a strainer and a few croutons are added. I have had a small box of fried ones with me for the past two months, and they have been tasted by numerous persons, including the members of the London Entomological Society and of the *Societé Entomologique de France.* Without exception they have been pronounced far better than was expected, and those fried in their own oil with a little salt are yet good and fresh; others fried in butter have become slightly rancid—a fault of the butter."

Mr. Riley concludes his interesting account by saying, "I can safely assert from my own personal experience, that our Rocky Mountain locust is more palatable when cooked than many animals which we habitually use on our tables. I mention the species more particularly, because the flavour will doubtless differ according to the species, or even according to the nature of the vegetation the insects were nourished on. I have made no chemical analysis of this locust food, but that it is highly nourishing may be gathered from the fact that all animals fed upon the insects thrive when they are abundant; and the further fact that our locust-eating Indians, and all other locust-eating people, grow fat upon them.

"Locusts will hardly come into general use for food except where they are annually abundant, and our western farmers who occasionally suffer from them will not easily be brought to a due appreciation of them for this purpose. Prejudiced against them; fighting to overcome them, killing them in large quantities, until the stench from their decomposing bodies becomes at times most offensive—they find little that is attractive in the pests. For these reasons, as long as other food is attainable, the locust will be apt to be rejected by most persons. Yet the fact remains that they do make very good food. When freshly caught in large quantities, the mangled mass presents a not very appetizing appearance, and emits a strong, and not over-pleasing odour; but rinsed and scalded, they turn a brownish red, look much more inviting, and give no disagreeable smell.

"The experiments here recorded have given rise to many sensational newspaper paragraphs, and I consider the matter of sufficient importance to record the actual facts, which are here given for the first time.

"Like or dislike of many kinds of food are very much matters of individual taste, or national custom. Every nation has some special and favorite dish, which the people of other nations will scarcely touch, while the very animal that is highly esteemed in one part of a country is not unfrequently rejected as poisonous in another section. We use many things to-day that were considered worthless or even poisonous by our forefathers. Prejudice wields a most powerful influence in all our actions. It is said that the Irish, during the famine of 1857, would rather starve than eat our corn bread; and if what I have written shall in the future induce some of our western people to profit by the hint, and avoid suffering from hunger or actual starvation, I shall not have written in vain."

Like the mysterious individual who first tasted oysters, and introduced them to the favourable consideration of the world, we certainly think that Prof. Riley deserves the thanks of the community for his courage in making the experiment of eating locusts, and the zeal with which he carried it out. No doubt our north-western friends, in the Province of Manitoba, especially those of French descent, who are usually more skilled in the arts of cookery than their Anglo-Saxon or Irish neighbours, will ere long look upon Prof. Riley as a public benefactor—one who has introduced a new and estimable addition to the luxuries of the table.
