REPORT

OF THE

FRUIT GROWERS' ASSOCIATION

OF ONTARIO,

FOR THE YEAR 1882.

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1883.

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ANNUAL REPORT

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FRUIT GROWERS' ASSOCIATION

OF THE

PROVINCE OF ONTARIO,

FOR THE YEAR 1882.

To the Honourable the Commissioner of Agriculture:

DEAR SIR,—I have the honour to hand you the report of the Fruit Growers' Association of Ontario for the year 1882. The discussions have been carefully taken down by an able short-hand reporter, and will be found to contain an unusual amount of very valuable information on matters pertaining to the objects of this Association. The papers contributed by the members will be found to be full of practical information, the results often of extended experience.

The *Canadian Horticulturist* has been enlarged to twenty-four pages, and otherwise improved, so that it is becoming a most valuable periodical and highly appreciated by the public.

The membership of the Association has increased upwards of fifty per cent. during the past year. There is evidently a growing interest in the Association, and its usefulness is continually being extended.

Trusting that you will be pleased with the work performed by the Association during the past year,

I have the honour to be,

Your most obedient servant,

D. W. BEADLE, *Secretary.*

PROCEEDINGS AT THE ANNUAL MEETING.

The Annual Meeting of the Fruit Growers' Association of Ontario, held at Kingston, 19th September, 1882.

President Dempsey was in the chair.

The minutes of the last annual meeting were read and approved.

The Directors' Report was read and received.

The Treasurer's Report was read and received.

The President presented his annual address, and a vote of thanks was accorded to him for it.

The meeting then proceeded to the election of officers for the ensuing year.

Wm. Saunders Esq., London, was elected President, and Wm. Roy Esq., Owen Sound, Vice-President.

Mr. Drury moved a nominating committee of three, carried.

The President appointed Messrs. Rykert, Dunlop, and Denton, Nominating Committee.

The Nominating Committee retired and prepared their Report, which was presented to the meeting by Mr. Rykert.

The following gentlemen were then chosen Directors: No. 1, John Croil, Aultsville; No. 2, P. E. Bucke, Ottawa; No. 3, R. J. Dunlop, Kingston; No. 4, P. C. Dempsey, Trenton; No. 5, Thos. Beall, Lindsay; No. 6, Geo. Leslie, Jr., Leslie; No. 7, W. H. Mills, Hamilton, who has since declined to act; No. 8, A. M. Smith, St. Catharines; No. 9, C. Arnold, Paris; No. 10, A. McD. Allan, Goderich; No. 11, J. M. Denton, London; No. 12. B. Gott, Arkona; No. 13, C. Drury, Crown Hill.

The following gentlemen were chosen Auditors: John A. Bruce, Hamilton; Angus Sutherland, Hamilton. Meeting adjourned.

DIRECTORS' REPORT.

To the Members of the Fruit Growers' Association of Ontario:

GENTLEMEN,—It is with feelings of great pleasure that your Directors come before you at the close of their year's labour and present their report of the condition of the Association.

During the year the membership has increased fully fifty per cent., rising from eleven hundred and ninety-eight to eighteen hundred and thirty-nine.

The binding of our annual report is a great improvement, for which we are largely indebted to the deep interest which the Honourable S. C. Wood, Commissioner of Agriculture, is taking in all matters embraced within the operations of this Association, and who feels that the information contained in these reports, is worthy of careful preservation.

We have acted upon the suggestion of your Directors of last year and increased the size of the *Canadian Horticulturist*, to very nearly double the amount of reading matter, and added a coloured illustration to each number, thereby enhancing very materially, both the usefulness, and attractive appearance of our Monthly. We have abundant reason to believe that these changes have met with the cordial approval of our members, and that they have been important means of increasing our membership. It will be for our successors to consider whether further improvements may not be attempted, and particularly, whether the popularity and usefulness of our Magazine may not be still further secured.

The experiment of reporting the discussions of the Winter Meeting by a shorthand reporter, proved to be so successful in securing a full and accurate report of the valuable suggestions and experiences given at those meetings, that your Directors obtained the services of the same reporter at the Summer Meeting, so that the report for 1882, will be one of the most complete and valuable ever issued. The Midsummer Meeting held at the flourishing town of Trenton was a great success. The attendance was remarkably large at that season, and the interest manifested in the discussions was very spirited. The Corporation of Trenton entertained the members with a magnificent banquet, at which the interchange of thought and of kindly feeling was continued into the morning hours. Many members availed themselves of the liberality of the Central Ontario Railway, to make an excursion to Picton and the Sand-banks, and in this way examine the capacities of that famous fruit growing country.

The planting of fruit and forest trees at the Experimental Farm, Guelph, was not so extensive this year as last, but enough was done to maintain and somewhat extend the work. We are happy to be able to say that the plantations are in a thriving condition, and that with care in preserving what has been done, and making each year such additions as may be necessary to meet the requirements of horticultural progress, the institution will soon feel the benefits of this work.

The financial condition of the Association is very satisfactory. Notwithstanding the increased expenditure consequent upon the enlargement and illustration of the *Canadian Horticulturist*, and the reporting of the discussions, we have been able to meet the demands upon us, and the year will close with means sufficient to meet all our liabilities.

All of which is respectfully submitted.

TREASURER'S REPORT.

Receipts.	$ cts.	
Members' fees	1,839 00	
Government Grant	1,800 00	
Advertising	17 50	
	3,656 50	
Balance at last audit	751 83	
		$4,408 33

Disbursements.	$ cts.	
Postage and Telegrams	74 22	
Freight and express	13 20	
Duties	39 80	
Printing, binding and mailing	906 55	
Directors' and Committees' Expenses	588 78	
Audit, 1881	20 00	
Guarantee premium	20 00	
Rooms, meetings	4 00	
Stationery	13 40	
Advertising	20 00	
Clerk	100 00	
Reporting winter meeting	55 00	
Plant distribution	497 28	
Illustrations	331 50	
Commissions collecting fees	66 15	
Secretary	200 00	
Editor	400 00	
Balance in treasury	1,058 45	
		$4,408 33

Liabilities.	$ cts.
Printing, binding and mailing	500 00
Illustrations	225 00
Directors and committees	200 00
Audit, 1882	20 00
Reporting summer meeting	35 00
Postages, express and duties	45 00
	$1,025 00

We certify the above to be a correct abstract.

JOHN A. BRUCE,
ANGUS SUTHERLAND, } *Auditors.*

PRESIDENT'S ANNUAL ADDRESS.

Members of the Fruit Growers' Association:

GENTLEMEN,—Another year has past and it becomes my duty to address you upon the important subject of horticulture. The season has not been favourable for the fruit grower. Over the greater part of our Province, the past winter was very severe. In many places there was no snow to protect the roots of trees or plants from the effects of the severe frost. In such sections strawberries suffered, some beds being frozen so they were past any possibility of recovery. With my own, the rains that came in April and May partly restored their vigour, so that they were induced to set an abundance of fruit. The drouth that immediately followed, caused the greater part of the crop to perish. Where frequent showers continued through the season the crop was good. The raspberries were destroyed, in many localities, by a cutting frost, when in blossom. Some places where they were more favourably situated, they escaped, consequently there was a full average crop harvested. The markets having ranged high have partially compensated for the failure.

APPLES AND PEARS.

Never in the history of your Association was there a better prospect of an abundant crop. The bloom was simply immense, but about the first of June the foliage and embryo fruit was attacked by a fungus or mildew, that utterly destroyed the prospect, that a few days previous was so bright. In some sections, where fruit has set partially, a large per centage of samples are spotted and one-sided. Plums, peaches and cherries have suffered in like manner. But I think in my own section of the country, the result may be attributed to the frost, that the roots of those trees were so near the surface, that in the absence of snow to protect them from the severity of the winter, many of them have succumbed to the effect. I have a row of early Richmond cherries that is grown in ground that freezes deep, and more than one half of them are dead. Some of my neighbours can testify to similar results with plums. Even apple trees have been affected in the same way. After listening to some remarks made by my friend, H. F. Young, Esq., of Trenton, at our summer meeting, I was induced to visit his grounds. There is a ridge or rise of ground extending across his orchard, where no doubt what little snow fell was blown off into the flats. On this ridge there are several trees of the most hardy varities frozen dead. It is only right to say here, that Mr. Young manured heavily with stable manure, and cultivated late last season; a practice that nearly always proves disastrous to an orchard and should never be done.

Grapes, in the more northern sections of our Province, when protected by being laid down for the winter, and covered with a slight covering, are giving a good crop of very fine fruit. In some places vines have been known to fail after starting into growth. The leaves turned yellow and presented a sickly appearance. A popular opinion was, that the frost had destroyed the roots. But an investigation was made by Messrs. Saunders and Denton, of London. Upon examining the roots of the vines, they found the effects of the Phylloxera, and the insects themselves in large quantities. I hope this insect pest will not prove so formidable an enemy to our vineyardists as it has in Europe. There the vineyardists, or at least many of them, have been obliged to abandon the enterprise, not being able to find any antidote or means for the destruction of the enemy.

IS THERE ANY POSSIBILITY OF OVERSTOCKING OUR MARKETS WITH FRUITS?

In the year of 1874 there was an abundant crop of fruit, of every description. Some growers did not know what to do with the surplus crop. Evaporators were not plentiful at that time; canning was poorly understood; vinegar and jelly establishments

were few and far between. The export to Europe was not introduced or practised to any great extent. The question was raised by not a few, will it pay to increase our orchards? The people were looking for an equal crop to follow the next year, but in vain, for a similar result was not experienced for six years. In 1880 a similar productive year returned. People having learned by past experience, were induced to erect large evaporating, jelly and canning establishments for the purpose of saving the surplus as much as possible. Where, I ask you, is that surplus to-day? Considerable competition has been observed between buyers of fruit this season. Some for export, but more for manufacturing. An estimate has been made after a thorough trial, and the result was, that a barrel of Northern Spy apples when canned was worth $8.00. Parings and cores when dried sold for five cents per pound, for the purpose of making jelly, and thus they paid largely towards the expenses of manufacturing. In as much then, as a universal crop does not occur more than once in five years, and the fruit growers are being educated to their business, is there any danger of a glut in the markets like those of 1874 and 1880 ever being repeated?

How are the fruit growers being educated? You are scattering every year through your report an amount of information that cannot be obtained in any other way, so reliable. Many able papers are being prepared by skilful hands, setting forth the result of practical experience and scientific truth that are being read at your meetings which are held in different sections of this fair Ontario of ours.

Again, the *Canadian Horticulturist*, published by you is ever full of reliable and useful information, the result of years of experience, gained through research, experiment and practice.

Allow me to congratulate you, that there is the disposition and ability in our membership to send out so much useful information upon such an important branch of industry, and a readiness on the part of our Government to provide the means for its dissemination. The results of your labours are being seen in the abundance of fine fruits now on exhibition at every fair and for sale in our markets, and those labours will be appreciated, I hope, by generations that are to follow you.

NEW FRUITS.

A good deal has been done within the last twenty years to produce new fruits. Wm. Saunders, Esq., of London, has surprised the world by his hybrid gooseberries, currants, raspberries and grapes. Charles Arnold, Esq., of Paris, has accomplished wonders in his new American Wonder pea and several other vegetables, besides strawberries, raspberries, grapes and apples. His Ontario apple bids fair to become one of our best market varieties. Messrs. Haskins and Mills, of Hamilton, have produced some very fine hybrid grapes, some of which I think must eventually create an excitement among the fruit growers of America.

There are many others that are engaged in this, one of the most pleasing of enterprises—I mean the producing of new fruits, vegetables and flowers by artificially crossing in the blossoms—whose names should be mentioned if it would not become wearisome to you. I wish that more of our young men would commence experimenting in this field. I cannot recommend too strongly an effort yet to improve the apple. Not but that we have varieties that are very good, and those that are vigorous, productive and hardy; those that possess good shipping, desert, and cooking qualities. But while the Baldwin possesses nearly all the good points for shipping, the tree is not sufficiently hardy in all sections of our Province. The Northern Spy seems to possess all the characteristics of a good fruit, but it is a long time coming into bearing, and when it does, the tree becomes tender and is liable to fail in a very few years. What we want is an apple that has as many of the desirable points as possible. At the present time the trees are propagated by grafting or budding the best varieties we have. Formerly nearly every family had a little nursery of seedling trees that has given to the world the immense collection of varieties we now have. Why can we not each plant a small orchard with seedlings from seeds saved from our best varieties, for by this means we may obtain some that will be superior to

anything that we now have in cultivation, and should they prove inferior, it is an easy matter to top graft them with such varieties as we may prefer. Let us try to get an apple that is as hardy, thrifty and productive as the Talman Sweet, and as good for shipping as the Baldwin, and with flavour as good as Coxes' Orange Pippin, and that will keep equal to the Ben Davis.

The person that will produce an apple that will possess all of these points, may be called a benefactor, and it may be said of him, "he has lived a life of usefulness, and his name will remain on the page of history."

ADVANTAGES OF CROSS FERTILIZATION OR HYBRIDIZATION.

What wonders have been achieved in the vegetable kingdom by cross fertilization within our own memory. But are there not greater results to be achieved by this art as time advances producing new and improved varieties of much superior excellence? Instances are so numerous of wonderful results being achieved by the application of this art in the production of new vegetables, flowers and fruits, in Europe and the United States, as well as in Ontario, that it becomes our duty to encourage those who may feel disposed to commence such an enterprise of so vast importance to the future of our fair Province. Who, I ask you, that has seen the results of this art in Arnold's wheat, peas, corn, raspberries, strawberries, grapes and apples; A. M. Smith's raspberries and strawberries; Saunders' raspberries, gooseberries, grapes and many wild flowers crossed with cultivated species; Haskins', Mills' and others' grapes, and pears, the many improvements throughout the world in the vegetable kingdom generally, can hesitate to say, that this is the art, is the great secret and source of the wonderful success that has been achieved during the last thirty or forty years? The Hon. Marshall P. Wilder says, that this improvement is all within the hand of man, to use it as he will, and that the field of progress is endless. It is your duty, gentlemen, to occupy the ground. The same Divine Power that gave us the almost infinite variety of plants and trees, also furnished them with the ability—not only to perpetuate themselves, but under judicious treatment, and a wise selection of parents, to produce indefinitely still better varieties than we now possess. In a word, we must depend mainly on the production from seed of fruits adapted to the various portions of our vast territory. And what richer legacy can a man leave to the generations that are to follow him than a fine delicious fruit, which he shall have originated by his own hand. This will be a living monument to his memory when posterity shall recline beneath the shade of its branches and pluck the precious fruit from the trees which he has left them.

PROGRESS OF YOUR ASSOCIATION.

Twenty or more years past, your Association was organized in the City of Hamilton. It was then called the Fruit Growers' Association of Upper Canada. I think the Hon. Judge Logie was the first President. Among the officers of that day we find very few surviving at the present time. There are, however, some among us yet. Charles Arnold, Esq., of Paris, who still holds a position among you, was then the second Vice-President. We find he has always done what he could to foster the interest of your Association. D. W. Beadle, Esq., of St. Catharines, was the first Secretary, and after looking over the history of your Association with care, I am only able to say, that the present Secretary has been the best that we have ever had; in fact, gentlemen, he is the Alpha and Omega thus far. While looking over your reports for the last score of years, I, as one of you, feel like congratulating him, for not only the amount of zeal which he has manifested, but for his untiring labours, serving this Association in the same position for so many years. We have several among us that have manifested an untiring zeal for the improvement of fruits, vegetables and flowers, that have very kindly given their time for the advancement of your Association. As the result of these labours, you have an increase of membership this year over the last of about seven hundred, a number that is not to be despised, when we learn that many kindred Associations upon this continent do not number more than one-third the amount.

How can we make our Association more useful? Our winter meetings are generally well attended, and it seems to me that every one that attends them is amply paid for the time and labour spent. We enjoy a privilege that can scarcely be attained in any other way, the privilege of grasping a brother's hand and exchanging ideas; privileges that seem too difficult to secure in any other way. Our Summer Meetings are not so well attended, coming as they usually do on account of the maturing of small fruits, just as the farmers are commencing to harvest. Can we not hold thirteen summer meetings—say one in each Electoral division, each meeting to be presided over by the director representing that division. It occurs to me that in this way we may induce many to attend and take part in our discussions that we don't have the pleasure of seeing or hearing anything from. Again, the information obtained would be sectional and consequently more valuable. The expenses of these meetings would not be so much as now, even if we had to employ a Secretary for each of them. The Agricultural and Horticultural Societies could in many instances be induced to unite with us. Nearly every farmer, merchant, mechanic, teacher, or gardener, is becoming interested in this, one of the most interesting branches of industry. Many questions are being asked every day: How can I best ornament my grounds? How can I grow raspberries and strawberries to supply my family? How do you manage to get such fine melons, cauliflowers, celery, and other vegetables? Thus we find the majority of our population becoming interested in this most important branch of husbandry.

Again, can we not in some way induce ladies to attend our meetings, by arranging our subjects so that they would become interested in them? Could we not admit man and wife as members upon the payment of one dollar and fifty cents, only sending them one copy of the Report and the *Horticulturist*? By this means the man could select his tree and vine, while his wife could choose her flower or vegetable, as the case may be. Can we not induce ladies to contribute papers to be read at these meetings upon their favourite flower, or their best varieties of vegetables or fruit for canning or culinary purposes?

FORESTRY.

More than that of other workmen, the farmer's business binds him at home. He lives on or near the soil he tills. Hence, above all others, he should try to make his home attractive and pleasant by planting ornamental trees and shrubs about his place. Can we not encourage a taste for arboriculture by introducing the study of Botany in our common schools? Could not our teachers make the study interesting by showing the children how plants grow, what are the component parts of a tree, the difference between the formation of wood and bark, and how to recognise the different species by their foliage and otherwise? Also by encouraging them to plant each a tree within the school grounds, each to watch and care for his own tree or plant. Could this system not be so introduced among our people, that the love and respect for tree culture will become so inculcated in the minds of the people that they will look upon any person that will deface or destroy any ornamental or shade tree, as upon one that would rob them of their own existence or best friend? Would it not have a tendency to some extent to do away with those bush fires that are so much dreaded? Could not our children so be taught that the next generation would hold our forest as sacred, and preserve them as one of God's blessings to them, particularly those forests situate upon lands that will not admit of cultivation? Cannot our farmers be taught, that, when clearing their lands, it will pay them to preserve all the surface soil and decaying foliage as one of their greatest treasures?

Gentlemen, I must not detain you any longer. These suggestions are made for your consideration. I know not whether you will find them of any practical value. The field opening before us seems to be boundless; to be one that will task the utmost power of human thought and energy. I wish you God speed in your every undertaking to further the objects of our noble society.

THE WINTER MEETING

was held in the City Hall, Hamilton, on Wednesday and Thursday, the 18th and 19th of January, 1882.

President DEMPSEY called the meeting to order.

The minutes of the last winter meeting and also those of the last summer meeting were read and approved.

The subjects proposed for discussion were then taken up.

GRAPES.

WHAT VARIETIES OF GRAPES ARE THE MOST PROFITABLE FOR MARKET?

MR. SAUNDERS was asked to introduce the discussion on this subject, and said: It is rather taking me by surprise to call upon me to give my views on grape growing for profit. I do not do anything of that sort. My grapes are all grown as the work of an amateur, and I do not know that I could give the meeting any information that would be of any value to them as to the varieties most profitable for market, other than as regards those that I know coming into market which have been grown by other people. The grapes that we find most abundant in the London market are the Concord, the Delaware, and some of Rogers' hybrids, particularly Nos. 15 and 4. I do not know that any of those grapes of later introduction—the more fancy varieties—are grown in our section for profit.

MR. BEADLE.—In the section of country where I live—the County of Lincoln—I suppose that as far as the experience of cultivators has gone, the Concord would be voted by our grape growers as on the whole the most profitable variety that they have as yet grown to any extent. They have found it to be very hardy and prolific, and to resist disease well; rarely suffering in fact from disease of any kind. They also find that it resists the attacks of insects, on account of its peculiarly woolly, thick leaf. It is true that grapes have been produced so abundantly of that variety that the price has gone down to an average, I should suppose, of about four or five cents a pound. Yet those who have raised that variety of grape say that even that rate pays them better than what they can get for any other crop, either of fruit or grain that they can get off the same acreage. Another variety of grape that is coming into favour with our planters is the Wilder—one of Rogers' varieties—a black grape of good size, and usually of a pretty good bunch. I believe that the average size of the bunches of that variety is better than that of several of the other Rogers' varieties. You are aware that the Rogers' varieties are apt to be very variable in the size of their bunches. I believe that that variety, on account of the grape being showy and the berries large, sells for about ten cents a pound wholesale. I am told that there is a gentleman living near Hamilton who has been growing it for market, that he had several tons of it last year, and that he wholesaled it at ten cents a pound—all his crop. Samuel Burner is the name of the gentleman I refer to. One of my neighbours living on the lake shore, Mr. William Reid, tells me that he finds that variety of grape a very promising one. He has been planting it and extending its planting, because of its having succeeded so well with him. He has also grown the Champion, *alias* Tallman, *alias* Beaconsfield; but he says that as soon as they can get a better grape people will not buy it. For a time it was a profitable grape, because it ripened so early that he got it into market before other grapes came in; but other grapes are coming into the market now, and consequently the time within which he can sell the Champion grape is so short that he does not market all his crop. It is a poor grape in quality, and he says that he will not plant any more of it for market. The Delaware grape is also grown in our section of the country for market. The small size of berry and bunch of that variety has been against it; but grape eaters have now learned its good qualities, and it will sell for a higher price in our market than the Concord. When the Concord is selling at four or

five cents it is bringing seven or eight, or possibly nine, and sometimes ten—say from seven to ten. I am inclined to believe, however, that the care it requires, good soil, good cultivation, and the taking away of superfluous bunches, it is prone to overcrop, makes it a little more expensive to raise than the Concord; and I doubt whether the increased price more than compensates for the increased care which it requires. On account of its growth in popular esteem in our section of the country, the demand for it is rather above the supply, and I think the demand for it is increasing. Unless some other variety of grape coming in about that part of the season, equaling it in quality and larger in size shall take its place, it is likely to be in demand for some time. Those are the varieties of grapes that are grown for market purposes in our locality to any extent. There are other varieties brought into the market, but it is only because there happen to be more in somebody's hands than are wanted for home consumption. I know of vineyards that are planted for wine making where they have other varieties, largely the Clinton, I am told; but for market purposes these are the varieties that are most planted with us; and I believe that everyone who has planted these varieties of grapes and has grown them has been satisfied with the pecuniary returns, even at what seems to be a low price for the fruit; that the amount of fruit that can be obtained from an acre is so large, and vines come into bearing so soon after being planted that grapes are thought to be profitable for the fruit grower.

Mr. Gott.—I claim to know very little about grape growing for market, although I do market considerable. The Secretary has named several of the best varieties. In addition to them we find some others profitable. The Hartford Prolific, for instance, we find to be very profitable in its season. It comes in immediately after the Champion, and before the Concord, and is a good flavoured grape, and takes well. Rogers' No. 9, usually known as Lindley, is a very valuable variety; his No. 19 is also good, and his Nos. 43 and 44 are equally good with No. 4. The vines are very hardy. Ive's Seedling is a most profitable grape, inasmuch as it is a most enormous bearer. The Iona in reference to flavour is, in my opinion, at the head of the list. It continues well in the market, and will command a good price. In some sections it is charged with tenderness, but the wood is very robust with us. When you say profitable for the market I scarcely know what to understand, because no two markets are the same. The tastes of markets differ, the same as the tastes of people differ. Some markets will require one kind of grape, and other markets will take hold of any kind of grape. We do not claim our markets up west to be first class, but the people there have tastes that we respect, and they will take hold of the Concord at the ordinary figure before they will take hold of the Delaware or Iona. The Iona and Delaware will not command extra prices in those markets on account of their extra qualities, but the Concord is everywhere acceptable.

Mr. Bucke.—I would like to know something about the profits of grapes, and about how much can be raised on an acre.

Mr. Biggar.—I agree with Dr. Beadle in regard to the Concord. I find that it is growing in favour more than it was, and an acquaintance of mine who sends grapes to the New York market says that there it is growing in favour. The quality of the grape depends a great deal on its cultivation. With good cultivation the grapes are much superior in quality. When I commenced attending the market here there were very few grapes brought in. If there came in 25 or 30 baskets extra, the market would go down on account of the quantity. The Concords were then ten cents to a shilling a pound, and the Delawares were a little higher. Since then the Delawares seem to have increased in value, from the fact that they have grown somewhat out of cultivation—the supply is not equal to the demand. I have grown four tons to the acre of Delawares and Concords—probably one ton of Delawares and three of Concords. At the time that I refer to they were sold principally in the Hamilton market. Some few were shipped to out markets—Guelph, Galt, London, etc. The profits were very satisfactory, but as grape planting became more extensive the prices declined, and we are now very glad to get three cents a pound for them at the station—three cents a pound for Concords and four and five cents for Delawares. The Concord, I have no doubt, is the grape for the people, its hardiness and productiveness, together with the quality make it so. I have fruited a number of Rogers', but cannot say that they have ever given me satisfaction. I have

fruited the Wilder, but have never found it to bear satisfactorily. The bunches were small, very showy, but not numerous. Those grapes have suffered from frosts. About eight years ago the thermometer went down 20 degrees below zero, and they were so injured by the frost that I never replanted them—I pulled them out. The price was a little high, but not high enough to compensate for the loss in the quantity. The Delaware requires a great deal of attention, and I think a man should have ten cents a pound for it, and five cents for the Concord, if he takes into consideration the difference in the cost of raising them. You cannot grow the quantity nor get the quality without a degree of attention that very few are willing to give to grapes. In regard to the Delaware, we have all been too ambitious to get quantity rather than to get quality, and our grapes have not ripened well. If we would have the courage to go through our vineyards and cut off about one-third of the Delaware grapes, and give them other attention—some pruning, some pinching back—we would have better Delawares, and command higher prices. Another grape that takes well in the market, an old known grape, one of our first grapes, the Isabella. I think it has been very much neglected. I find that it pays me well, in fact equal to any grape that I have. I find that every four or five years we lose a portion of the vines by the frost; but we can afford the loss. Last winter, a year ago, my vines were pretty nearly destroyed, but they are coming on again, and next year I shall have a good crop. There is no doubt that that grape will bear if properly taken care of, and I think its quality is much superior to that of the Concord. I shipped a couple of baskets to Glasgow, Scotland, a couple of years ago, and they went in very good condition. I should like to see the Isabella more extensively planted than it is. The Creveling is a grape that I am very much in love with. It is a good bearer, though the bunches are scraggy; but the quality of it is superior to that of any dark grape that I have ever grown, and the hardiness of the wood is all that you can desire. I would like to see the Hartford Prolific thrown out by the Society altogether, it is not fit for any decent Society to have. People must have a queer taste if they like it. The quality of the Iona is very fine, but it does not seem to ripen very well with me. I am on the lake shore. For wine making the Clinton, I think, stands ahead of any dark grape that I know of.

Mr. Dempsey.—There are a great many questions we should take into consideration in connection with that of growing grapes for market. The particular market to which we are sending our fruit is one thing that is very important to take into account. One market will require a certain quality of grapes, while another market will submit to almost anything. I find in marketing grapes that colour is a very important matter. Parties wishing to decorate their tables with fruits like to have a red grape, and a white grape, and a black grape, mixed on the table at the same time. Another question that we should not lose sight of is with regard to the season of maturity. I find that some varieties that ripen very early command a high price in the market, but a little later, when everything comes into the market, we must have a very fine grape in order to get anything like a remunerative price. Then we require a grape that will stand well—that will ship and keep. This year the grapes that were in first with us were the Champion and the Worden. They were sent into the market, and my little son, who was in charge of them, said, "Pa, I have one request to make of you, and that is that you will never send me to market with another Champion grape." I have thought that over, and if I can have any success in grafting, I will never have another Champion in the market again. But the Worden is in the market two weeks before the Concord. I do not know that it would produce so many tons to the acre perhaps as the Concord, from the fact that it is not so rapid a grower; but I defy any man to go into a vinery and select the Concord from the Worden from the appearance of the vine, either the foliage or the stock—they look alike exactly. I could not do it, at all events. I think that the Worden is one of the most profitable black grapes that we have. Moore's Early may be just as profitable—perhaps more profitable. On our grounds, a few days after our Delawares have set, we take the precaution to thin the bunches; we just walk along with a pair of scissors, and cut off about two-thirds of the bunches, and I find that this not only increases the size of the bunches that are left, but also causes them to mature earlier than the Concords. Nearly all varieties of grapes are benefited by thinning, and very little decreased in weight; but any decrease that there is in this way is more than compensated for by the increased

weight of the bunch. When we come to the later grapes, I find nothing that pleases me so well as Rogers' 44. It is a grape which you may cut, tumble into a basket if you like, send to market, and every berry of it will come out sound after being cut a fortnight. It will produce as many pounds of fruit as any of Rogers' hybrids. My wife on Sunday evening brought me some bunches of Rogers' 44 that had just been thrown in a pile inside of a store room, and subjected to light frosts, and they were really very fine fruit. I think that of all Rogers' black grapes I would place Rogers' 44 at the head of the list. It is a little later than 9 or 4.

A MEMBER.—Is it better than 43?

MR. DEMPSEY.—Yes, with me. I find, however, that these grapes, like other fruits, differ in different sections of the country. In some sections we find Rogers' 15 superior to any other of Rogers'. In fact, I plant it extensively on account of it being a red grape. This year we sent Rogers' 15, Rogers' 44, and one of my own hybrids, a white grape, to the market, and it commanded a high price, and was sought for by nearly every person, and they came a second time and a third time, and we did not lose any customers by it.

MR. BEADLE.—How many tons of Concords do you get to the acre in your part of the world?

MR. DEMPSEY.—I cannot answer that question fully, because I have not given the subject that strict attention.

MR. BIGGAR.—I have grown four tons to the acre.

A MEMBER.—What do you think of Rogers' 16.

MR. DEMPSEY.—It is rather a fine grape. Rogers' 34 and Rogers' 5 are also very fine grapes; but those happen to be three varieties that we have rooted out altogether, on account of mildew, it takes perfect possession of them, and I have abandoned the idea of trying to cultivate them any more. I should include the Salem among them. The Salem mildews with me.

MR. GOTT.—You have not mentioned any white grape, I think.

A MEMBER.—He is delicate about his own.

MR. GOTT.—We find Martha a profitable white grape. It takes well in the market. It is a heavy bearer. We used to have a good opinion of Rebecca, but last winter killed it down. The root is living yet. Rogers' 15 with us is a failure. The fruit is good, but it mildews so badly we cannot grow it. As to amount, we might give you a little of our experience. Our plantation consists of 250 vines, and their net product was 5,000 pounds. That is, for the season last past. The average product per vine was 20 pounds, and the value was $1.60 per vine. At the same rate of planting, an acre of ground would contain 544 vines, and the produce would be 10,880, or five and a-half tons, which would sell, at the rate that we sold ours at this season, for $870. This we find by looking over the Commissioner's Report from Washington is in excess of the highest given rate for the State of Michigan. In that State the highest given rate, according to the Commissioner's Report, was 10,000 pounds, and that was in the County of Kent. The average for the State was 4,523 pounds.

MR. ARNOLD.—I endorse what Mr. Biggar says about the Hartford Prolific grape. With us—when we get it, we have not got it—it is all on the ground. It does not stick to the bunch. Take it to the market and it is all in the basket instead of on the stems. And it is a very foxy grape. The Iona does not succeed in our section of the country—it is too tender. There are very few parts of the country that it will succeed in. I think north of the Grand Trunk Railway it will not succeed. The Delaware is a very fine grape. It is a gross feeder, and if it is well fed it will succeed. The Creveling is a splendid grape if it is well fertilized. It is so imperfect in its fructification that it should stand near some other grapes that have abundance of spare pollen. Otherwise you will find but three or four berries on the bunch. One favourite of mine is Rogers' No. 3. It is the earliest grape I grow, and I can get a double price for it. It is an early red grape, and has a good bunch. With me it is far more profitable than the Concord.

MR. A. M. SMITH.—How is it for bearing?

MR. ARNOLD.—The first vine that I got seemed to be failing. I took a number of layers from it, planted them in differents parts of the ground, and they bore an immense

crop, equal if not superior to anything I have. It wants to be put in the open ground. I had it alongside a building at first, and it did not seem to like that. It is quite as early as the Hartford Prolific.

MR. GOTT.—It is not always the most valuable grape that sells best. The Hartford Prolific is profitable in the amount of grapes that it produces, and in the supplying of the demand. We do not claim for them, however, first-class quality. Their falling off the bunch is the fault of the grower—not their own fault absolutely. Rogers' No. 15, Agawam, is not a success with us, although a very fine grape. All grape vines must be fed to some extent, and it makes very little difference what they are fed on so long as it is something good and substantial. I suppose the food mine gets is of that character.

MR. DEMPSEY.—The varieties of Rogers' hybrids that do best with us are 3, 4, 9, 15, 19, 43 and 44.

MR. BEALL.—When you were speaking of the kinds of grapes you sent to market, you did not mention the name of the white. Will you be good enough to tell us which one it was?

MR. DEMPSEY.—It was my No. 25. It requires some degree of care to cultivate it; it is liable to mildew. I thought at one time that I would try and make some money out of it by having it propagated, but I have not done that from the fact that the foliage seemed tender. It is a rapid grower. The vine is easily propagated. It is enormously fruitful, and requires to be thinned in the bunch and in the branches. It has made more money for me this year than any other two varieties.

MR. BUCKE.—We grow Mr. Dempsey's No. 60. He was kind enough to send me a vine a few years ago, and I have found it a very rapid grower, and a very good bearer. I have only had a very few berries from it that were ripe, however. It is of course very necessary to get an area of country in which a new grape will grow. I think this No. 60 is a grape that ought to be tried over various parts of the country. Some grapes mildew with Mr. Gott that grow perfectly well with me, and some grapes mildew with me that grow well with him.

MR. GOTT.—Another grape that should have been mentioned, inasmuch as the Society had something to do with its dissemination, is the Eumelan. With us it is a failure, inasmuch as it mildews very badly both in leaf and in berry.

MR. CARPENTER.—I may be styled the largest grower in this section of the country at the present time. Still I have been but very few years in it. I grow different varieties from most other persons about me. I have quite a number of Rogers' varieties, and for profit I would select of Rogers' varieties, the 4, 9, and 15, as far as I have cultivated it, although the 15 is not as valuable as the other two varieties. Last winter, a year ago, about half of my Rogers' varieties perished with the frost, so that I do not feel quite as enthusiastic on the Rogers' grapes as I did a year or two ago. I would consider the Concord, the Delaware, and the Rogers' 4 as among the leading varieties. We require more of the pink grapes to supply some of our markets. Our customers in the west as well as in the north require pink grapes as well as black ones. Some in London when sending for grapes will ask for Rogers' 9 and 15 and the Concord. In Sarnia they wish for some of the pink grapes as well. I have not fruited any of Rogers' 43 and 44 as yet. I have quite a number out. My Rogers' vines, particularly Rogers' 4, a year ago last summer, produced about 40 pounds to the vine, about two-thirds of them. The overbearing might have had a little to do with the winter killing. The greater portion of my Concords have this year borne about 30 pounds to the vine. My vines of that variety are five years old. I have the Rogers' 3, and I do not think much of it. The bunches are very inferior with me. It is an early grape, and it will hang on the vines until the end of the season. It ripened up a year ago. Last year it did not. It never ripened but once.

A MEMBER.—What did you think of it when you saw it ripe?

MR. CARPENTER.—Very good. The Iona with me did very well last year. That was the first year that I had any success in ripening it. It bore heavily. I believe Mr. Gott's vines are a little closer together than mine. Mine are twelve feet apart in the row. The Hartford Prolific I am not very much in favour of. Last year I picked once off them, and the remainder of them seemed to dry on the vines and to fall off.

MR. ORR.—Mr. President, in speaking of the Delaware you say that you pruned off about half or two-thirds of the bunches. I would like to ask you if you pruned early in the spring, and how much each of the vines would yield you on an average?

MR. DEMPSEY.—Our Delaware vines will only yield us about one-third of what the Concord vine will; but we grow two Delaware vines where we grow one Concord vine, and what the single vine yields us I would not be able to say, because I have kept no track of it whatever. I fancy that the Delaware would not come so far behind the Concord per acre as some imagine. It would not in our section of the country. There is a grape which has not been spoken about this morning that I would have liked to have heard something about, that is the Brighton. It is fruiting very well with us. It is a good grape, but it will not stand very long after ripening—it loses its flavour.

MR. BIGGAR.—Is it a good grower?

MR. DEMPSEY.—It is a good grower with us, and very prolific.

MR. BIGGAR.—I cannot get it to grow.

MR. CARPENTER.—That is my trouble too.

MR. DEMPSEY.—Wherever I have seen it in our section of the country it appears to be doing well. I have heard some men say that it was the best grape on their premises. Dr. Day, for example, cultivates a great many different varieties, only one or two plants of each kind, and I heard him say that the Brighton was standing at the top of the list, except my 25; and of course my 25 I do not recommend to anyone for the reason I explained. The Brighton grape requires pretty high culture. It requires considerable manure.

WHAT SORTS OF GRAPES ARE MOST DESIRABLE FOR AMATEUR CULTIVATION?

The discussion of this subject was next taken up.

MR. BIGGAR.—In some places one variety would do which would not in another. I can ripen the Diana very well. With you I suppose it would not ripen at all. Have you ever fruited it, Mr. President?

MR. DEMPSEY.—Yes, I have fruited it. It does not ripen, or rather it ripens in pieces. We will have a few grapes of it that will ripen and be very nice, but two-thirds of the bunch will never ripen at all.

MR. BIGGAR.—Occasionally with me one part of the bunch will be ripe while the other is green still. Those grapes will sell green in the Hamilton market better than some dark grapes.

MR. SAUNDERS.—I grow a good many kinds of grapes. The Diana is not a success with us. I do not think that in our district it would be worth cultivating. It ripens very irregularly; and for my part I do not like the flavour of it. I do not think the public generally are favourable to a grape with so much of the fox character in it, and with so tough a skin. So far as my own taste goes, I would put the Burnet at the head of the list for eating and for amateur cultivation. Next to that for eating I would place the Canada, and next to that the Creveling. Then there are some of Rogers' varieties that in my estimation would come in, and after them the Delaware and the Concord. The differences of taste in different individuals would of course result in great difference of opinion in matters of this kind; but for my own taste, and I find a great many people whose tastes run in the same direction, the grape that is not too dead sweet suits better than a grape that has that heavy saccharine character that some of Rogers' hybrids have.

At this stage of the proceedings, Mr. Woodward, of Lockport, N.Y., and Mr. S. D. Willard, of Geneva, N.Y., entered the hall, and were cordially welcomed by the meeting.

MR. SAUNDERS—resuming his remarks.—The Martha is another grape that succeeds very well with us. There are many people who like to see grapes of two or three colours on their table at the same time. You will find that the colour that is the scarcest in the market will command the highest price. The Delaware is a grape that with us commands a higher price than the Concord, and is a much pleasanter grape, to my mind, to eat, but the skin is a little tough, and when chewed is a little acrid. That quality of skin prevails very largely in the Rogers' hybrid varieties, and prevents you chewing the skin with any degree of pleasure. The skin of the Burnet and Canada can be chewed

for any length of time without producing any unpleasantness. I think that is a point that ought to be considered in grape culture. The Iona will not ripen with us in London. Mr. Gott is very favourably situated, close to the lake shore, and can of course ripen varieties that we cannot succeed in at all. Of Rogers' varieties, I think Nos. 4, 44 and 9 are the three varieties that I should prefer for table use.

MR. GOTT.—There is another very nice variety that comes under this head, and that is the Walter. It possesses very good qualities as a grape for amateur culture. We have not fruited the Brighton yet, but the vines are growing and doing well.

MR. SWITZER.—I am an amateur. In some sandy locations many grapes are apt to mildew, and although they will be good bearers they will have to be thrown out. My garden is clay, and I have no mildew in it. Raspberries will not wildew there. Nothing that I have mildews. I have tried many varieties of grapes, some have been thrown out. I have the Diana, and I have hardly been able to keep it within bounds. The stalks will grow almost any length, but there will be very few grapes on them. The few I have had were good. However, I have tried to cultivate it and give it such protection as I could, but it has been impossible to prevent it growing to wood. I like the Delaware very much. It crops every year. It is not so large as some of the other vines, but I like it for its sweetness and beauty. Rogers' Nos. 5 and 15 have been growing with me for some years, and they are very beautiful for the table—very beautiful to eat. I have grown the Sweetwater and the Golden Chasselas also. They are very fine grapes too—very nice for desert. I have the Concord and the Isabella also. I am glad to hear a good word spoken for the old Isabella. I think it is the best cropper I ever had in my garden, and I think it would be well if people would cultivate it. I grow a little for market, though I am mainly an amateur. Whatever is left from what my family eat we make into wine. The Clinton is the mainstay of the wine. We make about twenty gallons a year of it. We do not tap it until it is three years old, and then it is too good to sell any of it. I sometimes think that it is like the wine that Abraham and Lot drank, that makes the heart of man glad. I put nothing in the juice but the sugar, and there is not a headache in a quart of it. I have come in tired and taken a tumbler of it; and I think if there was more of that wine made it would do more good than all the temperance talk we hear. I will never drink any more wine in hotels. I used to, and once I sold it in my stores; but I do not drink any more in hotels, because it is not my wine, and it does not agree with me. Drinking my own wine makes me temperate.

COL. MCGILL.—This part of the subject interests me a little, the growth of grapes for amateur purposes. I have on my grounds some 22 or 23 varieties of grapes. I have 17 or 18 that are in bearing and have been for a good many years. They call me the king of the grape department in my country. The variety that I find most profitable is the red variety. I can sell my Salem and Rogers' 15 at from 15 to 20 cents a pound by the basket, while those that consume them can come up to Toronto and buy them at 6 and 7 cents a pound. I have an Isabella, and she is an enormous bearer, but she is a little too late. It is only occasionally that we can get her to ripen so that she is fit to use at all. I have Rogers' Nos. 3, 4 and 9. The 9 is a very fine grape on my grounds. I have no mildew whatever, and never have had any signs of mildew on any of Rogers' hybrids on my grounds. My soil is sandy loam. It is not underdrained, but there is no surface water. The exposure is rather northerly—northwest—one of the very worst exposures. No. 15 is not as prolific a bearer as I would like to have it. My Salems do well. I have good bunches on every vine; especially my prize bunches, which are sometimes a pound and sometimes over a pound. I never had any mildew on them but once, that was three years ago, a few spots that affected the fruit more than it did the foliage. The No. 44 I think very much of. It is a very prolific bearer with me. The Hartford Prolific is another prolific bearer with me. She is hardly second class, and I never can ripen her on my grounds before I ripen the Concords. The most of the grapes are on the ground when I come to gather them. I have been woefully disappointed in the Burnet, and that is the general experience of most cultivators of the Burnet in our part of the country. In some parts of the country it mildews dreadfully. In my garden (three years ago) there was a little mildew, and I removed it. It has borne for three years. The berries are very small, but they ripen and are very good. It stands just between

the Champion, the Hartford, the Delaware and the Salem, so that it has some good companions. The Brighton I think very much of. It is a very rapid grower on my grounds, but a shy bearer. The quality of the fruit, in my estimation, is very difficult to beat.

A MEMBER.—Is the Burnet a strong grower on your soil?

COL. MCGILL.—Yes. I have the Champion, and so far as dollars and cents are concerned, I make more out of it than anything else. A year ago last fall, when I was exhibiting at the county agricultural society's show, a gentleman came across my Champions. He helped himself to them, and said he, "that is the best grape, Colonel, I ever ate in my life." I said, "I am very much obliged to you, I never heard it get that praise before." I have no trouble in selling them for eight and nine cents a pound by the basket. I think very much of the Delaware. It is small. It bears very heavily, but we cannot sell the grapes for any more than the black. The Concord is, I think, so far as tested, the grape for the million. It is very popular, but I am inclined to think it will lose its laurels to the Worden Seedling. The Worden Seedling is, at least, ten or twelve days earlier, and equally prolific, if not more so; and I think in flavour a little better. My favourite among the reds would be Lindley (No. 9), and then the Salem. Then, the Lady Washington, so far as flavour is concerned, I think that there is nothing that can touch it. I have the Duchess, Prentiss, and friend Dempsey's No. 25. It has not fruited yet, but it has never shown the least sign of mildew on the foliage. I have fruited the Lady Washington. It ripened very well with me. I have fruited the Early Dawn and Moore's Early. I do not think so much of Moore's Early. I think more of the Early Dawn—of the fruit, but it is small in our section. It is the eye that has to be pleased more than the palate; they look at the size more than they consider the flavour. I have fruited the White Lady, and I like it very much. My grounds are very warm, and I train it pretty close. I have been trying this last few years to get the Niagara alongside of it. I would like to test it along with the rest. I have the Ann Arbour white grape from Michigan. It is a seedling from the Concord which has not fruited yet. I find most money in the Concord from its prolificness so far, because the others are just coming into bearing. Then come the Salem, Rogers' 15 and No. 9. They are red. I can sell them at any time from 12½ to 15 and 16 cents a pound in Oshawa, while they come to Toronto and buy what are supposed to be the same grapes and sell them for seven and eight cents.

MR. BUCKE.—I would like to say a word in favour of the Burnet grape, as an amateur grape, not a grape for the market. It has been fruiting down in Ottawa now for a couple of years, and it is very highly thought of by those who have fruited it. I do not know that it has been put on the market at all, but those who have grown it for themselves consider it an A1 grape. This year a great many of the berries on the vine had no seeds, and they were very small. I think this may be owing to some climatic influence in consequence of the shifting of the grape. We grow the Iona down there—a red grape—and we think a great deal of it for home use. It ripens with us very well if we do not let it crop too heavily. You should not have more than two bunches to every spur. They are also propagating down there. The Golden Chasselas de Fontainbleau, the Golden Chasselas it is called, is being very largely planted, and it sells very well. It is a white grape and the bunches are very large. Unfortunately the thrip has attacked it very much. We keep the grapes from being discoloured by the thrip by putting paper bags on them, and the bunches turn out very large and very fine. It is not only a good grape for private individuals, but it is a good grape to sell.

COL. MCGILL.—Another grape that slipped my memory—a new grape—that is bearing not far from me, is called the Janesville. It is a new seedling. It is earlier than the Champion—more prolific, and better and harder in the wood. It is enormously productive. It would only rank, however, as a second-class grape.

A MEMBER.—Do you grow that Chasselas De Fontainbleau without the use of sulphur?

MR. BUCKE.—Yes.

A MEMBER.—And does it never mildew?

MR. BUCKE.—No.

MR. ARNOLD.—Do you grow the Miller's Burgundy?

MR. BUCKE.—Yes. It is never injured by the thrip, and it bears very early, but it is so thick in the bunch that it bursts, and you must thin it or you do not get a crop.

MR. WOODWARD being called on to address the meeting, said:—I do not know of any grape in the whole list that is not desirable for the amateur to cultivate. He will have all the pleasure of cultivating it whether he gets any fruit or not. But with the farmer it is a different thing. He wants certainty. He has not time to grow grapes for the sake of growing the vine. He wants grapes for his children, and he wants them in plenty. And there are only a few grapes that the farmer can grow to a certainty. If the thrip attack a grape badly it is worse for the farmer than for the amateur. If the Phillоxera attack it that makes it worthless for the farmer also. The farmer wants a pure native American grape, with us, and I believe it is the same thing in Canada. Foreign blood is not for him. He wants something that is hardy, that is early, of which the quality is fairly good. I would not like to have my children learn to eat Champion grapes. I don't want them to eat anything that the hogs or the birds will not eat, and they certainly will not eat Champion grapes. Other grapes that mildew are good for nothing. The Hartford Prolific is not appreciated among the people for the reason that it drops badly, but if you take the Hartford Prolific, thin it out, and only let a moderate crop of fruit grow on it, it is not a bad grape—it is a hundred times better that the Champion. Farmers will not grow Delaware grapes. That variety of grapes must have a peculiar cultivation, and a peculiar position. It must be looked after carefully. But a farmer can plant the Concord, and, if he gives it a little care, he will grow Concord grapes for certain. There are some newer varieties that I think will be as early and as productive as the Concord, among them is the Worden. The Moore's Early, while it is earlier than the Worden, is not a grape that I would recommend. It cracks so badly, and it drops so badly. If it is not properly pruned it drops as badly as the Hartford. In quality it is not good enough. It is not as good as the Concord, nor beginning to be. The Rogers' hybrids we cannot grow for family use. They must have more care than the ordinary farmer will give them. So with the Burnet. We tried them over there with us, and they mildew very badly. I know of very few new grapes that it would pay anybody to plant them for family use or for farmers' use.

MR. WILLARD was also asked to speak, and said:—The wind has been pretty much taken out of my sails by those who have spoken. I have to speak from my own standpoint, and what I may say should be taken with a great deal of latitude, there being such a difference of soil and climate, even in localities so near together as that in which I live and Canada. There were certain general principles advanced by my friend, Mr. Woodward, that carry a great deal of weight with them. I think with him in meetings of this kind we ought to recommend something that will please, something that is adapted to the masses. The people generally do not discriminate with that nicety that your President or Secretary, or Mr. Woodward would. My own idea is that you have got to go to the Concord parentage or that type for those varieties of grapes that are adapted to the masses. I have studied that subject so much that I may have got into a rut, but if I have I cannot get out of it very well. I cannot get rid of the idea that we must stick to a certain type of grape to give the people the kind they want. In my opinion we want a good dark grape, the best; we want a good amber coloured grape, the best; and we want a good white grape, the best; as the best adapted to the masses. I have found in my experience that all our hybrid grapes that have been crossed with foreign blood succeed in some localities admirably, and ten miles away are a failure. I fear that, with regard to some of our newer varieties of white grapes; I fear, that with regard to the Prentiss for instance. I have no doubt whatever but what the grape, of which my friend Mr. Woodward is the advocate, will succeed well anywhere, because it has the right parentage. And I believe that true in regard to the Pocklington. I believe it is a good grape; and I believe it will succeed well, because it has the right parentage at the bottom of it. I believe that for an early grape, we have, perhaps, nothing better than the Worden Seedling. I believe I planted it among the first vines sent out by Mr. Worden, and it has succeeded well with me. I desire to mention a new amber-coloured grape which I believe is going to make its mark—that is, the Vergennes. I have no interest in it, but it ripens early, and also keeps till very late. It originated up in Vermont. It ripens

with me about the same time as the Concord does, and it will keep till February most beautifully.

MR. HASKINS.—We know that in Europe, in the best grape-growing localities, they cannot grow grapes in every field, or on every part of a farm; they must have fields with an eastern or southern exposure. If they did not do this, but planted their vines on the tops of hills where there was no protection from the winds, they would fail to grow grapes. I think, if in this country we looked for suitable locations, or planted artificial protection on the north and west, and took the same precautions that they do in Europe, we would grow almost all our native grapes in the open air. In that case I think there are many varieties that we could successfully grow out of doors. There is the Iona, in this district, and from here to Niagara, I look upon it as very valuable if it is not allowed to overbear. The Delaware can be grown out of doors with a little precaution in this section of the country, and it will succeed well if not allowed to overbear. The Concord will grow almost anywhere. I think if we look for protection on the west and north—windbreaks of evergreens, or a hillside, or a fence—we shall succeed with most of Rogers' hybrids, the Iona, the Concord, the Delaware, and many other varieties.

WHICH VARIETIES OF GRAPES ARE THE BEST FOR WINE-MAKING?

MR. HASKINS, in introducing this subject, said: So far the grape that I have used for wine-making is the Clinton, for the most part. The fruit ripens on arbours, and is left till the frost touches it, and is then mixed with other varieties.

A MEMBER.—How do you find the Delaware to compare with it as a wine-making grape?

MR. HASKINS.—Of itself I do not think much of it, but mixed with other varieties I think it is very good.

A MEMBER.—Do you use the Concord to any extent?

MR. HASKINS.—Yes; it is very good to use with the Delaware. There is a great deal of flavouring matter about the Concord, and very little about the Delaware. Put them together and they make a very fine wine. And I think the Niagara probably, when we can get it, will be a good kind to mix with the Delaware for flavouring. I think I have not anything to say as regards wine-making but what you have heard or read before on the subject.

MR. BUCKE.—Mr. Haskins, there is some insect which attacks the Clinton, and the berries do not ripen on the bunch. How do you find about that?

MR. HASKINS.—If you will let them hang till the frost touches them, I think they will be pretty well withered up, they will not do any damage. I think clean cultivation will get rid of the thrip. Some say not, but I have no other theory about it. I think I find that ploughing in the fall and burying the leaves destroys the thrip.

MR. BUCKE.—Is the sale of native wine increasing?

MR. HASKINS.—I think so; very much.

MR. SAUNDERS.—It was a marvel to me to see Mr. Haskins' garden almost clear of thrip last year when I went to see it. I think the reason is what is given. I did not see any rubbish about the place—any dead leaves or anything of the sort. The thrip lives through the winter, and, if there is no hiding-place for it, it has to emigrate to where it can get shelter, or die.

MR. GOTT.—We find the more we cut or prune the Clintons, the more they grow to wood.

MR. HASKINS.—We grow the Clintons on eighteen-foot span arbours, so that the horses can travel under.

MR. GOTT.—Then you do not prune at all?

MR. HASKINS.—Yes; we prune once a year.

MR. GOTT.—No summer pruning?

MR. HASKINS.—We thin them out.

MR. SAUNDERS.—But not the wood?

MR. HASKINS.—No. I think we have new grapes coming on that will make a wine that will rival the best imported wines. A short time since an English gentleman, who

had lived very many years at Oporto as the agent for an English wine house, called on me, and I showed him a native port wine that he thought very well of. He did not think that it was grown in this country. It was made from a new grape that I am growing myself. I do not want to sell the plants; I want to grow all I can of them myself. The grape is called the Abyssinnian. I exhibited it at London last year.

MR. SWITZER.—I think it would be a good idea if everyone who grows grapes would make wine for the sake of the effect it would have in promoting temperance. It was a very difficult matter at first to make wine, because we got the idea that the grapes had to be squeezed through cloths. Then, when it was put in the barrel to ferment, it had a great deal of impurity to throw out, so that it would be months before it purified itself. We have now got over that; and, after using all the grapes that we require for our house, we mix together all that are left and put them through a sausage-machine, and that breaks every one. They are then thrown into a large tub with a tap to it, and to keep the must from getting into this tap we put some twigs of the grape-vine over it, so that the liquor may percolate through that. In the course of a few days the wine comes to the top and the skin begins to drop. That is the proper time to turn the tap, and when it is turned then you would be astonished to see how dry it would drain. Sometimes we put a gallon of water in, and it hardly comes out coloured. If we want to have a dry wine or a sweet wine we then put the sugar in and put the wine away in our casks. It soon effervesces a little—it has nothing more to discharge—and in the course of a few weeks we put the bung in a little, so that in case of any further effervescing it shall not blow out the end of the keg. The older the wine the better, but in the course of three years it is good. You may open it sooner if you like. If you let it go to four or five years, though, and then bottle it off, you will have a wine that you will be surprised at. I do not put anything to it but the sugar. If I want a dry wine I put in a pound, if a sweet wine three pounds to the gallon. The amount of sugar depends greatly on the amount of sweet grapes that I put in the mixture. I am indebted to Mr. Haskins for a hint he gave me. Three years ago he took me down to his vaults and gave me a bottle of wine to take home. I brought him back a bottle in return. Mr. Haskins tested the wine, and he told me exactly how it was made. He said, "you do not reduce it." I said, "no." He said, "you put brown sugar in; you should not do that." I said I thought there was more sacharine matter in the brown sugar than in the white. He told me that was a mistake; and I use white sugar now.

MR. BUCKE.—In putting the grapes through the machine, do you break the seeds at all?

MR. SWITZER.—No. The object of putting them through that was to break the grapes. Even if it did break the seeds, they would not run out through the tap. The wine percolates through the twigs, and comes out perfectly pure. They use something like that in the old country in the making of beer.

MR. HASKINS.—Might it not be better to press them through a very coarse sieve than through a sausage-machine?

MR. SWITZER.—That might be done, perhaps; but we put the machine over the tub, and grind them through it.

MR. BEALL.—Don't you press the grapes at all after they are ground?

MR. SWITZER.—No.

MR. DEMPSEY.—I have been cultivating grapes ever since I commenced cultivating fruit. Then my first experience was only with three or four varieties, which, I believe were then the only varieties in cultivation in America. I then resorted to exotic varieties, cultivating them under glass. It always delighted me to treat my friends as well as I could, and we frequently used on the table exotic grapes—the finest we could grow, mixed with some of the hardiest outdoor varieties—even sometimes Hartford Prolific—and I have seen friends select the Hartford Prolific as the best grape. So that it seems as though it must be left to everybody to select the fruit that suits him best. For my own taste, and for many persons', as an amateur grape I would take, first of all, the Worden for an early grape. I find nothing that I have fruited superior to it. There are several varieties, however, that I would be very sorry to reject. There are several of my seedlings that I prize very highly as amateur grapes. I prize the Brighton very highly

as an amateur grape. It matures sufficiently early, it looks very nice on the table, and none of us is going to object to its flavour. I prize the Walter also very highly as an amateur grape. It is almost useless for marketing purposes. It does not require very high culture, neither does it require with us very careful culture. I would never reject the Delaware for amateur culture. It is one of our grapes. I was very agreeably disappointed this year when I fruited the Pocklington. I found it mature with us earlier than the Concord, and it suited nearly every persons' taste, who had the privilege of tasting it on our grounds. When we come to Rogers' hybrids we find several varieties that are appreciated; but I must confess here that I do not appreciate any of them—they leave an unpleasant sting about the tongue, that I do not care for at all. Still, some of them, on account of their keeping qualities, we can enjoy after all the other grapes are gone. They are of no value to us where we cultivate the Burnet. I cultivate the Burnet largely and successfully, and I do not know how long it can be kept. I have never seen it spoiled, and I have never seen a spoiled berry on it yet. We do not suppose it is going to succeed in every section of the country, but, as an amateur grape, I would be very sorry to do away with it on my ground; in fact, I could not.

MR. SAUNDERS.—Does it mildew with you?

MR. DEMPSEY.—I have seen some of Rogers' hybrids, the varieties I have just spoken of, mildew. I have seen the Burnet vines growing in among them, and not one particle of mildew on it.

MR. HASKINS.—I can say the same thing.

MR. DEMPSEY.—I am not going to say it is exempt from mildew, because, I believe, every variety of grape, to a greater or lesser extent, is subject to mildew. This year, when the Burnet was in blossom, there came a very heavy rainstorm, and the pollen seemed to be carried off, not only from the Burnet variety, but from every other variety that was in blossom at the time. The Burnet went on, and produced a very small berry without any seeds. My No. 25 I have fruited extensively, and I have fruited it so that I have sent it to market, and it commanded the highest price this year of anything that I sent to the market. It is one of the hardiest grapes I have, and one of the most rapid growers. It is also one of the most productive varieties that I have, and, if thinned, it ripens very well with me; but it is inclined to be late. It is a very high-flavoured grape. I sent a sample of it to Mr. Saunders in the fall, and I presume that he can give a better opinion of it than I can, for the reason that we are all liable to cultivate our taste to a certain variety—we can cultivate a taste even to like tobacco. No. 6 is a very rapid grower. It is the Delaware crossed with Allen's hybrid. It is a very early grape. It is the earliest grape we cultivate; but it drops off the bunch very early. It is a small grape, a little larger than the Delaware, but it is almost a white grape.

MR. SAUNDERS.—In regard to the samples of this white grape sent to me by the President in the summer, I must say I was favourably impressed with it. The berry was about as large as the Concord, a little more oval in form, and sweet and good in every respect.

MR. DEMPSEY.—In justice to another Province (Quebec), I have this to say: Mr. Bucke was speaking of cultivating the Royal Muscadine in Ottawa—the Chasselas de Fontainbleau, or Golden Chasselas, I think he called it—they are all the same thing. If you look at the report of the Farmers' Association from Abbotsford, in Lower Canada, you will see that there are a large number of exotic varieties there that they are succeeding with; and they can actually cultivate some varieties of grapes that we cannot succeed with here at all. That is the fact in the vicinity of Ottawa, on these south-eastern slopes, where the soil is largely composed of a shaly, slaty rock. Grapes will mature there earlier, and they are finer than we can produce. The farther we come south, the more liable does fruit appear to be attacked by mildew. I am not surprised at our American friends feeling astonished at seeing us growing and succeeding with grapes in the open air. It only makes us feel prouder of this Canada of ours.

MR. ARNOLD.—We do not succeed in growing the Muscadine in our section of the country satisfactorily; but, there was a white grape, sent out by some gentleman in Hamilton, some twenty-five years ago—by Mr. Fairman—called the Canadian Chief, which is much more hardy than the Royal Muscadine. It is not so liable to be injured by the

thrip. The parentage of it I do not know anything about. I feel sure it would succeed with Mr. Bucke far better than the Sweetwater or the Chasselas. I endorse very much what our American friends say with regard to this Labrusca family. There is no doubt that they will succeed better than others where the thrip prevails.

MR. WELLINGTON.—With regard to the amateur, I think he must decide for himself, to a great extent, what grapes he will cultivate. Some will praise one variety, while others condemn it, as my experience shows. I was pleased to hear the remarks in favour of the Worden. That is a grape that I noticed for the first time this year, particularly. I think myself its quality is better than the Concord. Its productiveness is probably not up to that of the Concord, but good. It ripens early, and then, late in October, in going over our grounds I have found good samples of it, and they have tasted exceptionally good. The Brighton, I think, is another that should be in every amateur collection. If you take into account what a farmer would cultivate, I do not think that, for general culture, the Brighton would suit him—and I do not think it would suit every section—but an amateur would like it. It will not keep, however, and must be eaten when ripe. I have eaten Champions that have been equal to Concords, and I have eaten Champions again that would make a pig squeal. The first Champions I ate came from Charlotte, and at that time I thought the grape was totally useless. After that I ate some that had been grown a little north of Richmond Hill; and the flavour was equal to that of the Concord. They ripen a little later there; and, being hardy, I formed the idea—and I hold it still—that in a great many sections, where other grapes cannot be grown, it is a valuable grape. When you come to talk about a grape, which is for the masses, I agree that you have to get a grape with a native strain in it; and nurserymen and others are now working on such grapes that I think there is a class coming forward that will be very valuable, especially of the white grapes. Of course, being interested in a white grape, I do not wish to say anything about that kind. I think, in the end, the best grape will come to the surface, and will be recognised, and in the hands of the public. I believe that, besides the grape I am interested in, there are others that will be very valuable. I believe, also, that in other colours we shall have grapes that will do away with a great many varieties that are now being cultivated.

MR. WOODWARD.—I was in Montreal last summer and I thought I would look up the Champion; and they told me the fact was that the Champion grape coming into Montreal market had crushed the whole black grape market. Everybody there thought every black grape was the Champion. One gentleman at Chateauguay told me that, if they had never put a Champion grape in the Montreal market, it would have been hundreds of dollars in his pocket every year.

It being one o'clock, the meeting now adjourned till two o'clock.

After the adjournment,

A committee to examine the fruit on exhibition was appointed by the President, consisting of Messrs. William Saunders, S. D. Willard, and A. McD. Allan.

CLEMATIS.

WHICH VARIETIES OF CLEMATIS ARE BEST FOR CULTIVATION IN ONTARIO?

MR. BUCKE, in introducing the discussion, said: I have not much to say about the Clematis—merely that the Jackmanii appears to be perfectly hardy with us, and I presume others are quite as hardy. I have seen the Clematis in England. The white varieties grow very beautifully over the houses there in the south of the island. I have seen Mr. Wellington's catalogue, and, I have no doubt, he can say something about the Clematis.

MR. WELLINGTON.—I suppose my report last year covers the ground about as well as I am in a position to do now, with the exception of some of the newer varieties, and those, as I was appointed chairman on the committee on climbers this year, I have taken

up in my report, and probably when that is read the discussion might be brought forward with regard to the Clematis.

The PRESIDENT.—If you are ready, I would suggest that we have your report.

MR. WELLINGTON.—It is not ready yet, but will be in a few minutes.

MR. WILLARD, being called on, said: I do not know of anything new in regard to Clematis. I do not know that I can say much to the edification of the gentlemen present, except that I yet think there has nothing been brought out in the shape of a coloured Clematis that is superior to the Jackmanii. There may be others being brought out in England that will supercede it, There are white ones that are desirable, but I do not think any of them have met the views of the people so well as the Jackmanii.

MR. BEADLE.—I think Mr. Wellington has probably told us correctly that his report last winter has covered the ground very fully, and I only wish to emphasize one point with regard to it. As far as my experience goes it is this—that I think our Canadian people will be more likely to succeed well with those varieties that bloom upon the new wood. There are two classes of these Clematis. One variety blooms upon the new wood, and the other upon the old wood. In the family that bloom upon the new wood, even though they should get somewhat injured by the winter, or by any other cause, the young wood will throw out its shoots—from the root even—and bloom freely throughout the summer; and if well fed, so as to be kept vigorously growing, they will keep on blooming all through the season, with very little intermission. I fear that if our buyers and planters should get on to the varieties that bloom from the old wood they might be disappointed; perhaps the plants might get winter killed in some severe winters.

MR. SAUNDERS.—I admire the Clematis very much as a class of plants, and have found them very satisfactory indeed as far as the culture of them has gone with me. I have not had many varieties. I have had the Jackmanii for a long time, and that is one of the most satisfactory of all. I have had Tunbridgensis, and it is another one that I have found very good indeed. I have also had two white ones, which I cannot recollect the names of just at the present moment. There is another variety of Clematis that is extremely hardy and very ornamental when in fruit. I have forgotten the name of it for the moment. The flower is yellow, and when in fruit it becomes a mass of those delicate feathery fruit heads, which are of a very brilliant silvery cast. When the sun shines on them they present a very beautiful appearance. We have it in our Mount Pleasant Cemetery in London, and it is one of the things which attract the most attention, I think, of any growing on the ground while it is in seed. The flower is inconspicuous—a dull yellow—and while it is in flower it does not attract much attention. Our native Clematis, the Virginana, blooms profusely, and has quite a pretty flower. It is very useful as a covering for unsightly objects. Then there is a bluish purple one that is native to this country, that grows from Maine to Wisconsin, called the Bordicillerous, which we have cultivated to some extent. But there is none of them that is so handsome or so wonderfully covered with blossoms as the Jackmanii. I have found no trouble in growing them, they grow without protection. They shoot up from the base every year, they usually die down to the ground, and send up new shoots which blossom on the wood, commencing, I think, about the beginning of July, and continuing blooming for about two months, during which the plants are perfect pictures of beauty.

MR. WELLINGTON here read the report of the Committee on Climbers.

REPORT OF COMMITTEE ON CLIMBERS.

Nothing in the floral world has added more to its beauties or is more varied in their uses than the long list of climbing plants of various kinds, and yet no class of plants are more neglected than many of our most valuable climbers—whether it be the "Ivy Green" of the old song, the magnificient and brilliant beauty of the gay Clematis, the graceful Wistaria, the modest Honeysuckle with its wealth of intoxicating fragrance, or the odd,

yet attractive Dutchman's Pipe, they are all too frequently absent from our gardens. There are so many positions in which they can be utilized, both for adding to the beauty of a place, or hiding a defect, that one is often surprised at the want of taste—shall we say—in the laying out of our gardens and grounds. For rockwork, for hiding an unsightly stump or building, and turning it into a thing of beauty, for trellis or pillar, for bare walls, for the arbour, and even for bedding plants, there are some of our climbers specially adapted; nor must we forget the gorgeous Rose, the climbing varieties of which belong to this Report. There is the blushing Anna Maria, with its well formed and large clusters of bloom, the bright rosy red large, compact and globular Queen of the Prairies, the carmine crimson Gem of the Prairies, and the modest white—the finest of its class, the Baltimore Belle, all belonging to the hardy Prairie Roses (*Rubifolia*). Then there is the Ayrshires which from their slender growth are more properly speaking running roses, and are best for covering banks, buildings or unsightly objects; they are also remarkable for succeeding in the poorest soil. Will often run twenty feet in a single season. Of these we would recommend Bennett's Seedling—pure white; Queen of Belgians—pure white; Queen of Ayrshires—dark purple and crimson.

The Noisette, Tea and Banksias of climbing habit, we will pass over as our report will be more particularly given to hardy out door climbers. From Roses we pass on to our best deciduous climbers.

DECIDUOUS CLIMBERS.

Akebia Quinata.—A singular Japanese, climbing plant, with neat shining sub-ever green leaves, and purple flowers, perfectly hardy, and worthy of more attention.

Ampelopsis Quinqefolia (*Am. Ivy or Virginia Creeper*).—One of the best known as well as most valuable trailing shrubs, beautiful digitate leaves, turning to rich crimson in autumn. Has tendrils and clings like the Ivy, and is excellent for walls, and screens, arbour, and verandah.

Ampelopsis Veitchii or Japan Ivy.—The best of all foliage climbers for outer wall decorations. Leaves smaller and finer than Virginia Creeper, forming a dense sheet of green; clings with the utmost tenacity to brick, stone, or wood and even iron, foliage turns to a rich crimson in autumn, grows rapidly when once established. Many specimens of this plant can be found covering scores of yards of surface with bright glossy foliage. Invaluable for the walls of churches and public buildings.

Aristolochia Sipho (*Dutchman's Pipe*).—A native plant of climbing habit. Rapid grower, with large dark green foliage, ten or twelve inches in diameter and curious pipe shape, yellowish brown flower in July.

Dolichus Japonicus.—A new and rare climber of immense growth, covering twenty feet in a season, and having long racemes of purple and white flowers (Wistaria like), excellent to cover rocks and stumps.

Hedera, Ivy.—There are many varieties of this, not a few of which are too well known to need mention. Among the latest and best is New Silver Striped. Body of leaf deep green heavily bordered with white, clean and distinct, and a very fair grower. There are a number of kinds having silver margined leaves, but none equal to this in size of foliage, vigour of habit, and beauty. Other sorts are veined and spotted with yellow, and are very beautiful for house plants. All varieties of the Hedera, we believe, are too tender for outdoor cultivation in the North.

Hydrangea Scandens. (Japan Climbing Hydrangea).—This is a new and very rare plant, the merits of which have not been fully developed. Thos. Hogg describes it as clinging to trees to the height of fifty feet, producing corymbs of white flowers of the size of the ordinary Hydrangea, leaves cordate, sharply toothed, longstalk, dark green, slow growing and possibly a little tender while young. We have not flowered this plant but have it growing, and are favourably impressed with its appearance. If hardy, and having the beauty of flowers of Hydrangea Paniculata, it will be a most valuable addition to the list of climbers and no doubt become immensely popular.

Jasminum Officinalis (*White Jasmine*).—Not entirely hardy, requires southern exposure, delicate and beautiful foliage and flowers, fragrant white, blooms in July.

Loniceras.—A few sorts only of these are necessary to mention.

L. Halleana (*Hall's Japan Honeysuckle*).—A strong and vigorous evergreen sort, with flowers white, changing to yellow; very fragrant, and in profuse bloom from June to November. We consider this the best of the Honeysuckles, and most admirable for rockwork, screens, walls, and fences.

Lonicera reticulata (*Golden Leaf Honeysuckle*).—Leaves distinctly and finely veined with fine golden lines, foliage small, and growth moderate, makes a beautiful bed or border plant, as well as desirable for screens, and walls, hardy, and one of the most beautiful of its species.

Lonicera Semper virens (*Scarlet Trumpet Honeysuckle*).—Strong rapid grower, blooming all summer; flowers without fragrance, but this and its varieties have the handsomest flowers of all the Honeysuckles.

Lonicera Sinensis (*Chinese Honeysuckle*).—Dark green foliage which hangs very late, blooms in July and September, and is very fragrant. A very popular sort.

Periploca Græca (*Silk Vine*).—A rapid growing beautiful climber, native of Southern Europe. Will twine around a tree thirty to forty feet high, foliage long narrow and shining, flowers purplish brown, in clusters.

Tecoma or Bignonia (*Trumpet Flower*).—Strong growing showy flowers—scarlet crimson and orange, good either for trailing or as standards.

Wistaria Chinensis (*Chinese Wistaria*).—Rapid growing, and elegant, attaining an immense size; has long pendulous clusters of pale blue flowers in May or June, and in Autumn; it may be grown as a standard.

Wistaria Chinensis Alba (*Chinese White Wistaria*).—The best white Wistaria, habit not so strong as the blue, but fair grower, and blooms freely, a little tender when young, needs high culture and a little protection until well established.

Wistaria florepleno (*Double Purple Wistaria*).—A charming new variety with perfectly double flowers, deeper in colour than the single. The plant is perfectly hardy, and like the Sinensis in habit. The most valuable of the Wistarias, and will be in great demand when better known,

Wistaria Magnifica.—Flowers in dense drooping racemes, of the same size as the Chinese, and of a pale lilac colour. Foliage of the same graceful habit as the American. Vigorous and hardy.

Clematis Montana.—A remarkably free growing Indian climber well adapted for trailing over walls and trellises. The flowers are white with a dash of pink and tuft of straw-coloured stamens; sweet scented and very copious—the branches literally becoming converted into floral garlands.

Clematis Virginiana.—Another of the strong free growing sorts, having small fragrant white flowers, and excellent for screens and walls.

We think these varieties of Clematis are deserving of more than a passing notice. At the time when the Virginia Creeper is turning its foliage, C. Montana, and Virginiana are in full bloom. They are quite as vigorous in growth as Virginia Creeper, covering an immense surface, and the great profusion of their fragrant flowers, in the form of a dense spray, make them remarkably beautiful. They are extremely hardy, enduring any climate without injury. We can most safely recommend them to any who have walls or screens, or unsightly places to cover, or who wish a hardy free growing beautiful climber.

The already long list of Clematis is being yearly increased by contributions from the best English growers, most prominent of which are Geo. Jackman & Son, and Thos. Cupps & Sons.

Much attention seems to have been directed, and with considerable success to the

production of the double flowering sorts, all of which, however, are of the Patens or Florida type, and these free summer bloomers only.

We give descriptions of some of the newest and choicest introductions.

NEW SORTS.—PERPETUAL BLOOMING CLEMATIS.

Duchess of Teck.—A pure white, with a faintly delicate mauve bar. Awarded a first class certificate by the Royal Botanic Society.

Duke of Norfolk.—A very deep mauve colour, with a broadish pale bar, the anthers are dark coloured.

Earl of Beaconsfield.—A rich royal purple, splendid form. First class certificate from the Royal Horticultural Society.

Lilaciana Florabunda.—Pale grey lilac, deeply veined, and abundant bloomer; a fine contrast to C. Jackmanii for bedding purposes.

Grand Duchess.—A splendid variety with flowers about nine inches across, blush white and of good quality. First class certificate, Royal Horticultural Society.

Guiding Star.—Purplish hue, shaded with crimson, maroon band down the centre of each petal. First-class certificate, Royal Horticultural Society.

Louis Van Houtte.—A strikingly showy variety with bluish purple flowers.

Lady Caroline Neville.—Beautiful bright mauve, with deeper bars. First-class certificate, Royal Horticultural Society.

Lord Neville.—Flowers large and well formed, colour rich dark plum. Stamens light with dark anthers, edgings of petals finely crimped. First class certificate, Royal Horticultural Society.

Othello.—Flowers medium, a good shaped six petalled variety. Late and very free flowering, colour velvety purple.

Purpurea Elegans.—Deep violet purple, light coloured filaments and pinkish brown anthers. First-class certificate, Royal Horticultural Society.

NEW SORTS.—DOUBLE FLOWERING SUMMER BLOOMING CLEMATIS.

Countess of Lovelace.—A decided advance on John Gould Veitch, both in habit, colour, and form, a bluish Lilac, rosette shaped, forming a double flower.

Belle of Woking.—A fine double variety of the Florida type, with about eight series of sepals, and a small tuft of stamens. The colour is a charming delicate but decided tint of bluish mauve or silver grey, the innermost sepals having here and there a dash of reddish lilac, the filaments white, supporting cream coloured anthers.

Enchantress.—A very large and distinct variety, good habit, bearing very double white flowers; the exterior petals are very prettily flushed in the centre with rose. First-class certificate, Royal Horticultural Society.

Venus Victrix.—Another double variety, but of a delicate lavender colour, having sepals very broad and finely formed. First-class certificate, Royal Horticultural Society.

INDOOR CLIMBERS.

Of the indoor climbers, there are few that thrive with ordinary house culture if we except the Ivies. Of these

Helix Tricolor (*Tricolor Eng. Ivy*).—With its leaves of green, white and rose.

H. Canariensis or Hibernica (*Irish Ivy*).

" *Var latifolia maculata* (*Broad Leaved Variegated Irish Ivy*).—With broad leaves, distinctly variegated.

H. Picta.—Small leaves, fine lobed, and

H. Roegneriana or Colchica (*Giant Ivy*), with large thick leathery leaves, are the best. There is however, one plant which should be in every collection of indoor plants and which seems to do well with ordinary culture, and that is;

Manellia Bicolor (*Origan Rio Janiero*).—Named in honour of Xavier Manette, prefect of Botanic Gardens at Florence; one of an elegant family of greenhouse climbing plants, suitable for training over a wire trellis, attached to the pots in which they grow; it delights in a moderately warm and moist atmosphere. It is a winter flowering plant, the flowers are scattered thickly along the vine, colour scarlet tipped with yellow covered with fine hairs that resemble the marking on a butterfly's wings, the whole flower of a waxy texture, tubular in shape, terminating in four short points, giving it a square appearance from the face.

W. E. Wellington.

Among our native climbers, there are several sorts deserving of notice. First, among these we would place the wild Yam (*Dioscorea Villosa*), a perennial plant, with thick, fleshy, knotted roots, which send up early in spring a number of rapid growing shoots, which soon develop, leaves strongly netted veined and wonderfully beautiful, these leaves overhang in a regular symmetrical manner, the colour of the leaves is a deep rich green, the flowers are small, whitish and inconspicuous, found throughout the southern part of Ontario.

Celastrus Scandens (*False Bittersweet*).—A rapid young climber with handsome foliage; flowers green and insignificant, followed in the autumn by bunches of berries of a brilliant scarlet.

Menispermum Canadense (*Moonseed*).—A very pretty climber, with large and pretty foliage of a rich green colour, which twines around trees and tall shrubs in our woods; the flowers here are also inconspicuous.

Adlumia Cirrhosa (*Climbing fumitory*).—A biennial climber, common westward, but not found as far as we know in Ontario. The foliage of this plant is very beautiful, finely cut, and a very free bloomer, flowers formed as in Dielytra spectabilis, and of a yellowish white colour.

W. Saunders.

Mr. Saunders.—The Clematis, the name of which I was trying to recall a little while ago, is the Graveolens, the yellow flowering one. The Periploca Græca has been growing with me for some years, but I have never had it flower. It is a very rapid growing climber, and I think it is one that deserves to be well known.

Mr. Beadle.—I move that this report be received with thanks, and be handed to the Publication Committee to to be incorporated in our annual report.

The motion was seconded and carried.

FENCES.

Mr. Beall submitted the following report from the Committee on Fences:—

ROAD-SIDE FENCES.

The Committee to whom was referred the report of the Committee on Fences at our last winter meeting, with instructions to furnish such facts, figures or circumstances as led them to the conclusion arrived at in that report, now respectfully submit,

1st,—That every farm of 100 acres, divided in the usual manner will have about 1,200 rods of fence thereon.

2nd,—That one of the best and most economical fences now coming into general use is a straight one, made of cedar rails and posts. It is usually built five rails high, the ends of the rails being inserted into augur holes in the posts, which are set firmly in the ground, in line, 12 feet apart.

3rd,—The cost of such a fence for a farm of 100 acres will be about as follows:

8,250 Rails at $52 per 1,000	$429 00
1,650 posts at 18 cents each	297 00
Digging holes and setting posts at 10 cents each	165 00
Boring holes in posts at $1 per 100 holes	82 50
Cutting and turning rails, at $1 per 100	82 50
Setting up the rails at 10 cents per length of 5 rails	165 00
16 Gates. Hung and painted at $6 each	96 00
	$1,317 00

or about $1.30 per rod. Such a fence is estimated to last about 25 years. The gates about 10 years.

4th.—The annual charge for permanent maintenance of such a fence will therefore be:

Interest on (say) $1,300 at 6 per cent	$78 00
Estimated average annual charge for repairs and for permanent maintenance at 6 per cent	78 00
Extra, do. do. for gates, 10 per cent	9 60
Rent of land, lost by fence 6 feet wide—4.36 acres at $5 per acre	21 80
Total	$187 40

The foregoing estimate has been made with the assistance of a thoroughly practical farmer in the Township of East Whitby, and we are of the opinion that although the cost of such a fence must necessarily vary much in different localities, the cost of material and labour here submitted may be regarded as a fair average for the whole Province.

5th.—Your committee are of the opinion that the kind of fence as usually constructed in the back country involves a much greater annual expenditure than the one here described. A common snake fence of the same length will require about 26,000 rails, which are usually made of basswood, pine, elm, ash, &c., &c. Supposing these to be hauled a distance of one mile, they will cost about

$30 per M., or	$780 00
Labour in setting up at $4 per 100 rods	48 00
Preparing and setting 16 sets of bars at $2 per set	32 00
	$860 00

Such a fence is estimated to last about 10 years, the bars about half that time. The annual charge for such a fence would therefore be:

Interest on $860 at 6 per cent	$51 60
Estimated average annual charge for repairs and for permanent maintenance 15 per cent., or	129 00
Extra, do. do. for bars 20 per cent	6 40
Rent of land, lost by fence 12 feet wide—8.72 acres at $5 per acre	43 60
Total	$230 60

showing an annual expenditure on a farm thus fenced of $43.20 for permanent maintenance, greater than on the fences first described.

6th,—The estimate, therefore, in the second paragraph of the previous report of two dollars per acre per annum seems a moderate one, and your Committee are of the opinion that if farmers were not compelled to fence against their neighbour's cattle, they would protect their crops and their own cattle by live fences of trees forming wind breaks; by the use of hurdles, and otherwise, (which would add much to the general beauty of the country and thereby greatly enhance the value of the land) at less than one quarter of the yearly expenditure above shown, or—in other words—that the farmer of every 100 acres of land in Ontario could realize a clear yearly profit, over and above what he is now doing (if every owner of stock were compelled by law to keep them enclosed), of $150.00.

7th,—That the foregoing figures showing the unnecessary but compulsory annual expenditure of $1.50 per acre for all cultivated land, by the unwise laws at present in force in this Province, have been carefully prepared, and therefore, by applying them to communities of farms, we find that the annual loss from this cause to the large Township of London in the County of Middlesex,—having a cultivated area of nearly 70,000 acres—is over $100,000. The Township of Mariposa, in the County of Victoria, having cleared land to the extent of nearly 48,000 acres, looses $72,000 annually. The Model Farm at Guelph losses by the same means annually about $800. These figures when applied to the whole Province assumes gigantic proportions, for we find from official reports that there are at the present time between eleven and twelve millions of acres under actual cultivation. The total loss, therefore to the farmers of Ontario must be upwards of $16,000.000 per annum.

THOS. BEALL, *Chairman.*
P. E. BUCKE,
THOS. HALLIDAY WATT.

COL. MCGILL.—I understood you to say that the old snake fence lasted ten years. I used to be a practical fence maker. I was brought up in the woods. I came into Canada in 1820, and settled in the Township of Pickering when it was almost in a virgin state, and I know a little about making fences. I have been married now 47 years, and I built a fence some time before I was married, and it has never been made over from that day to the present. It keeps all the cattle in.

MR. BUCKE.—What wood is it made of?

COL. MCGILL.—It is made of pine and cedar.

MR. BUCKE.—Is it staked and ridered?

COL. MCGILL.—It was staked and ridered at first; but the stakes have been down these last fifteen years. It has never been repaired; it has never broken down to the bottom rail, and there is a northwest wind with a sweep of four miles that rakes it. There is a good deal of fault found with the timber, whereas it is the men who use that timber and put it up who are to blame. If the rails for a rail fence are cut at the proper time of year, and properly split and put up, the fence will last twice as long as if they are not. A worm rail fence costs more in its first construction than the fence of which Mr. Beall was speaking. There is a large proportion of that fence being built in the Township of East Whitby that will not last half as long as a worm fence. It does not occupy as much ground; but there are six feet of ground even at a straight fence that is not ploughable, because you have to keep far enough away from your wires for the end of your whippletrees. There is a little more than that in a worm fence; but you can get right up to a worm fence. Six hundred and fifty twelve-foot rails will make a worm fence forty rods long and four feet high if the rails are what they ought to be; and a rail fence put up in that way will last as long as two straight fences, because the posts of the straight fence will decay in one half the time between wind and water. The first fence spoken of is not as good a fence. It is not as durable a fence, from actual experience, as to take two posts and set them in and put rails between them. The tenon is only two inches that goes into each post—though sometimes about four, when you happen to have an extra sized post.

—and then the merest sag of a post will let the ends drop out. It is then almost impossible to get them replaced again, because your posts are supposed to be fast at both ends. Now, if you are ascending a lofty hill or going down a decline the posts are not perpendicular. If they are they have not got a hold, and the moment one begins to sag, out comes your rail. There are hundreds and hundreds of rods of it in East Whitby that is not going to last half the time that the ordinary straight fence fastened with wire is, and just from that very fact. I have never seen a rod of it that was according to the Legislative enactment. The law says in reference to fences that a lawful fence shall be four feet and a half high, composed of substantial rails or boards—that the lower half of the cracks shall not be more than four inches wide. Now, you cannot build a fence of the kind first described and get the cracks that way. Supposing you have every rail exactly alike, when you come to cut off the shoulder to make the tenon there you have a large crack up against the post. Our law is such in Ontario that any municipal council may pass a by-law compelling the owners of cattle, horses, sheep, turkeys and geese to confine them on their own land, and if found running on the highway they are poundable; any person can take them up and pound them. We have had that law in East Whitby for years, and I am happy to say we are not half as particular now in making our outside fences as we used to be. I know a man who has 150 or 200 acres of land, and there is not a fence along the road that will keep cattle out. I was pleased last fall when I was in York State to see no fences as I passed along. There were the most beautiful lawns and flowers without a fence or a rail to protect them. I am in favour of that, although I have criticized the report as I have. We have a law now enabling us to have that here too.

MR. BEADLE.—Once on a time I ran for Reeve of the Municipality of Grantham. At that time I was living in that municipality. I had not been absorbed into the city of St. Catharines then. I should state that I had been Reeve the year before, and I had advocated very strongly the passage of a by-law such as our friend has just now spoken of—that every man should take care of his own pigs, and sheep, and cattle, and geese, and so on. My opponent in the election of the next year raised the cry that I was opposed to the poor man. There was a certain *poor man* always around somewhere who had a cow, or a sheep, or a small flock of geese or ducks, or a dozen turkeys, and I was not willing that that poor man should have anything for his pigs, or sheep, or cows, or turkeys to eat; and the result of the election was that I was beaten.

COL. MCGILL.—That same cry was used in the township I live in for years; and the gentleman who had the by-law passed had his cows out the next year.

MR. H. O. SMITH.—I have a fence on my place that has stood there for forty years, and it is a good fence yet and has never been repaired. It is a rail fence, composed of pine and ash rails. I have no doubt it will stand for fifty years.

MR. DEMPSEY.—I have seen rails that were over ninety years old in my own section of the country. They had been split from butternut. They were undoubtedly very large rails when they were first made; but they are gradually growing less every year through the rain wearing them away. Then I have seen butternut cut not more than ten years that have failed since.

FRUIT PACKAGES.

MR. DEMPSEY, on a report being called for from the Committee of Fruit Packages, said that the Committee had not prepared any report. He proceeded: The Committee met several times; but one or two of the members thought it better to allow every man to swindle all he pleased. The result of every effort to arrive at any conclusion has consequently been a failure. We took the trouble to examine into the law to see what there was regulating the size of the apple barrel; and there is no such thing that we could find. I believe there is a law in Canada fixing the size of *a barrel* at 31½ gallons, imperial measure; but custom has often disobeyed this law. With respect to packages for small fruits and peaches we could not come to any conclusion. Two of us, however, were of opinion that three half-pints would be sufficient for a strawberry basket—as

large as it could be used for shipping purposes. When we came to peach baskets we were of the opinion that twelve quart baskets were preferable to baskets holding half a bushel, from the fact that the fruit would carry safer in them, and enable the peach-grower to place his peaches in the market in an honest shape. In fact, he could have control of his baskets, and nobody could accuse him of dishonesty, because it would not be understood that there was half a bushel in the package. We could not agree on any conclusion; and we decided not to make any report unless this meeting wished it. One member of the Committee opposed everything that the other two of us proposed.

Mr. Pettit.—I am in favour of our shipping the fruit in such packages as will bring us the most money. If we were required by law to ship any certain sized packages we could not ship sometimes in as good shape as would be desirable. In the case of the early peaches, for instance, you will get as much for the small packages as you would for the larger ones. It is to the interest of the grower, I think, to preserve his freedom in this matter as far as he can. Of course it is different with the consumer.

Mr. Dempsey.—It occurs to me that, supposing there was some authorized size for the peach basket, a man might honestly ship half baskets as half baskets, because if there is a law that regulates the size of a bushel of potatoes it does not follow that a man must always have a bushel in every quantity he sells.

Mr. Bucke.—It appears to me that this age of civilization requires universal measures; and I do not see why the fruit business should not have a standard measure just as well as anything else. If a person sells a small gallon for an imperial gallon he is hauled up now-a-days. I do not see why there should not be a standard for fruit as well as a wine measure or a dry measure.

Mr. Drury.—It just depends on whose interest you are looking at. If you are looking at the interest of the grower you had better leave it so that he can make a little deduction—not large enough, perhaps, to attract attention, but large enough to do a service to him. But if there is to be justice and fair play all round, then I say there should be a standard.

Mr. Gott.—I maintain that it is an injury to the grower not to have a standard. It occurs something like this: An honest grower takes a half bushel, say of peaches, and charges so much for them. "Oh, but," says the buyer, "we get them in Toronto for so much a bushel; they are half bushels." "Well, are you sure they are half bushels?" "Oh, yes, they are half bushels." At the same time they are not half bushels. In this way the home-grower is injured. Therefore I think it is important that we should have a standard. I would say it is not only in the interest of the fruit growers, but also in the interest of the public. We should have something, especially in the case of strawberries and raspberries, and in the case of peaches. As for grapes, they are sold by the pound, and we know just exactly what we are getting.

Mr. Biggar.—There are two sorts of baskets introduced for peaches, twelve-quart baskets and fourteen-quart baskets; and I have known men with fourteen-quart baskets selling them at the same price as those with the twelve-quart baskets. Now, when this has been done somebody has got a bargain, or somebody has got cheated. If we used only fourteen-quart baskets we could put a half-bushel in them without crushing them, and the fruit would come to the consumer in a good condition. I would be in favour of selling peaches by weight—making so many pounds a bushel, and making the baskets accordingly—making three sizes of baskets.

A Member.—Couldn't that apply to all fruits?

Mr. Biggar.—Yes, to berries and other small fruits. I shipped some peaches last year in the large baskets in order that they should go in good condition. I sent them to Collingwood, and explained that the baskets held fourteen quarts. Still they did not give satisfaction. I put more peaches in than I put in the twelve-quart baskets; but they were not heaped up. They were in good condition; but they were not satisfactory, and I had to go back to the twelve-quart baskets.

Mr. Beadle.—I quite agree with Mr. Drury's view of the matter. I think that what is fair for one would be fair for the other. If the grower of fruit wants to be honest and treat his customer honestly he ought to be willing to sell a bushel for a bushel, and not sell fourteen quarts for a half bushel. A law was introduced, if I remember rightly,

a few years ago that we were to sell root crops by weight; but I do not think that it is done. I know we go into our market and ask for potatoes, and they are so much per bag. The seller never talks about weight. I presume large cargoes are sold by weight. Then if we were to weigh strawberries and raspberries I suppose we should be troubled by getting into ounces and fractions of ounces, perhaps. But if a fruit grower uses a twelve-quart basket when he should use a sixteen-quart basket, I hold he is doing wrong.

Mr. ORR.—I would not be in favour of selling peaches by weight. If they were sold in that way we should be looking for peaches with large pits. But I think we might easily arrange it to have a standard basket of fourteen or sixteen quarts, and have baskets of three or four different sizes based on that—whole basket, half basket, and quarter basket. By sending the fruit in large boxes a grower can sometimes make as much out of them by shipping them in large lots as by shipping them in small.

Mr. DRURY.—I think the proper thing would be to have a law enacted to this effect: That there should be so many cubic inches in what we call a basket of peaches, and then that a basket of that size and, for convenience, baskets which were fractions of it should be made standard measures. If that were done it would meet the whole case; while it would be no injustice to the grower, I believe it would be ample protection to the buyer.

Mr. WOLVERTON.—I think there should be a standard size of basket; but the question is what the size should be. We ship a great deal from about Grimsby, and the size we generally use is the twelve-quart basket—not from any intention to deceive the buyer, but because that is the most convenient size in which to ship soft fruit. One way, of course, to avoid any difficulty is to state in shipping what the basket contains. That is what we do.

Mr. BEADLE.—I do not think there could be any exception taken to the use of baskets of various sizes as long as it was understood between the buyer and seller whether any basket being purchased was a twelve-quart, a fourteen-quart, or a sixteen-quart basket. But the difficulty comes in just here: I buy a basket of peaches, and it may be twelve, fourteen, or sixteen quarts; and the purchaser sometimes thinks he is getting one when he is getting another.

Mr. GOTT.—We get the reports of the New York markets almost every day, and peaches are quoted at so much a basket, and we do not know how much that is.

Mr. DEMPSEY.—I hope nobody will think there is any imputation intended against any person who may use the small basket; this is simply a discussion. I was in Montreal last year looking at the fruits in the market there; and I found I was using a berry basket the same that most of the others were using—one that held a little more than three half pints. By rounding the berries very high you could put a quart in them. You would see some lots of strawberries there in which the baskets of the top tier in the case were heaped up, and the under ones very poorly filled. Those fruits were soon found out, and they then went for from one to two cents less than the berries of the honest shipper. Then I found that some did not fill the baskets of the top tier any higher than those of the lower ones; and there were some persons that shipped into that market that got, during the whole season, about two cents a quart more than the quotations. So that I am satisfied it pays the producer to use such a basket and fill it in such a way that he can go into the market and conscientiously say "there is so much in it." I have been in the market with my strawberries, however, when I knew the basket did not contain a quart; and when the people asked me "Is there a quart in it?" I would tell them "Oh, no, not at all." Then another man standing a little way off would be asked "Is there a quart in your basket?" and he would say "Oh, yes;" and he would sell his berries before I could sell mine simply because he would lie about what the baskets contained. Strawberry packages should be twice the size of raspberry packages in order to ship the fruit successfully.

Mr. WOLVERTON.—I would like to ask our American friends if they have a standard peach basket, and, if so, what the size of it is.

Mr. WOODWARD.—The size of our basket is just exactly the size of a lump of chalk. Every man goes as he pleases. We have thought over this, and had committees on it, and had legislation; and yet the thing remains just where it started. I find they are

having the same trouble in Michigan. I think there are only two practical solutions to this question. One is to sell everything by weight. That is a thoroughly practical solution. Another is to brand every basket with its size, and let a man sell any size he pleases. Half the berries in the market of New York are in third pint packages; and men who grow extra nice berries put them in even smaller baskets than that. They call them third pints, or half pints, or quarter pints; whatever they are you will see them quoted at that.

Mr. DEMPSEY.—I would be satisfied if the Legislature would compel the seller to mark the basket with just what it contains.

Mr. DRURY.—That would just meet the difficulty. I know it is a cause of complaint all though this northern country that there is a variation in the size of the peach baskets; and we find we are not getting what we expect.

Mr. PETTIT.—If the packages were marked—take those for peaches, for instance—if you shipped a twelve-quart basket of peaches, and they got pretty soft before they got to their destination, so that they would not measure the twelve-quarts then, should they be confiscated on that account? Are you to guarantee they are twelve-quart baskets or not?

A MEMBER.—Guarantee the twelve-quart basket

Mr. BIGGAR.—In shipping a basket of peaches from here to Quebec, if the peaches are not very hard they will sink an inch and a half on the passage. The only way to sell peaches or anything of that kind that shrinks is to sell by weight. I have known peaches to sink as much as two inches in going to Collingwood. It is utterly impossible to pack them so that they will not shrink.

Mr. ORR.—Berries picked in a damp day and then passing through a dry day would shrink perhaps more than one-tenth in weight, so that there would be the same objection to weighing.

Mr. HONSBERGER.—In my business I am using three different sizes of packages, a four-quart basket, a twelve-quart basket, and a sixteen-quart basket; and I ship the most of my fruit. Sometimes, however, I go to the St. Catherines market. I had one time both twelve-quart and sixteen-quart baskets for the sale of peaches, and, when a customer would come up and want a basket of peaches and I would say to him, "Here is a twelve-quart basket and here is a sixteen-quart basket, which will you have?" He would say, "Oh, I will take the twelve-quart basket, it is lighter; I can carry it easier." He was willing for that reason to take the twelve-quart basket at the same price as the sixteen.

A MEMBER.—Was the price for each of them the same?

Mr. HONSBERGER.—The price for the twelve was exactly the same as for the sixteen.

A MEMBER.—The same quality of fruit?

Mr. HONSBERGER.—Exactly the same.

Mr. DRURY.—I move that Mr. Bucke be added to the Committee, and that the matter be referred back to the Committee, with instructions to reconsider the subject, and to report to this meeting if possible.

The motion was carried.

Mr. BEALL was called on for the Report of the Committee on Roses, but said he had not had time to prepare it.

Mr. BEADLE moved that the committee be continued, with a request that they hand in their report to the Publication Committee in time for the next annual report.

The motion was carried.

CELERY.

Mr. TAYLOR was asked to introduce a discussion as to the best method of cultivating celery and the best varieties of it. He said: I do not know that I can offer you much on the subject. Celery has been almost a failure in this neighbourhood of late. We tried to grow it, but the thrip has almost destroyed it. My idea is that it does not pay to grow it for the market. In cultivating it we manure it well. We bank it up the first time we

plough it. We do not sink trenches any more—merely plough it—we cultivate on the surface. The insect keeps eating off the outside leaves.

Mr. GOTT.—Will the gentleman state what varieties he has had that experience with.

Mr. TAYLOR.—The small size grows solid and good. The pipe stuff is no good for the market at all. We cannot find out anything that will stop the insect.

MR. BUCKE.—There is a great deal of celery grown down at Ottawa. It grows naturally in low ground. It is a kind of swamp plant. At Ottawa they grow it in black muck, and they find that in deep black muck it grows best. I have seen splendid crops grown in that way without any manure at all. They find that it keeps better in the winter in the muck than in sand. It almost always rots if kept in sand in the winter time.

Mr. WOODWARD.—I grow enough celery to eat, and I am surprised that the American people use so little celery as they do in their families. Of all the vegetables I know of I do not know of anything, aside from the potato, that is more indispensable to a family's welfare and enjoyment as celery; and I do not know of anything that is more easily grown, provided you have a supply of water. I grow the celery for my family in my city lot. I have grown this year 70 rows 60 feet long. They have had all the celery they wanted to use from the time it was large enough, although it is on the table three times a day, and I have enough yet to last till April. There are two things requisite in growing celery. One is to have the ground rich, and the other is to have plenty of water. That which I want to use in the fall I hill; that which I want for winter use I do not hill, or only enough to keep it up and keep it close. I take those deep boxes such as men's rubbers come in; I set the box right on the end, take up the celery with all the dirt I can get adhering to it, put a little light loam across the end of the box, lay in the celery, fill in around the roots with the soil in which it grew, and spread some loam on top. Then I lay on top of that another tier of celery, and so on until I fill the box. I then carry the box into the cool part of the cellar, and, if I want to water it, I go and pour a pail on there, and it will absorb into the bottom of the box. I was looking at my celery the other day, and there is plenty of it grown up new in the box. I buy my plants at the gardener's. I have forgotten the name of the celery I have this year, but I like it better than any I ever had. It is a purple celery. It has more of the distinctive flavour of the celery than any of the green celeries I have ever grown. It does not look so well on the table as the green celeries, but in taste it is very much better. Mr. Storrs, of Michigan, has a way that seems to me fully as good as mine where it is available. That is, instead of filling in with loam, he uses packing moss such as the nurserymen use; and where that is obtainable I think it is preferable to the loam, and very possibly it would keep the celery just as fresh.

A MEMBER.—Have you an insect?

Mr. WOODWARD.—In very dry weather we have a little trouble with the insect unless we have plenty of water. During the very dry weather this summer I set the water running on my celery plot, and it ran about three quarters of the way across. My little boy shut it off; I did not notice it; and in less than a week you could see the line that the water went to by the size of the celery. And the start it thus got it maintained until it was time to take it in in the fall.

Mr. BEADLE.—With regard to variety of celery, the one that has pleased me best is the one that we know by the name of the Dwarf Sandringham. We do not want those large, coarse green kinds. It is some years since I have grown any of that kind of celery. It is undesirable for table use in comparison with the dwarf varieties. I have never tried Mr. Woodward's variety of purple celery, and perhaps he is correct in regard to it; but there is a sweet, nutty flavour about this Dwarf Sandingham celery that is very agreeable to me, and I believe to all persons who have used it. With regard to the cultivation of celery, I have known what Mr. Bucke said about it to be true. There is a part of my grounds that is a black, mucky spot, and water goes there in the spring, and fall sometimes. We have put the celery there of late years, finding it grows better there—I suppose from the very reason that there is more moisture there. This being a very dry season the celery stood still through the summer, and I saw the effect of insects on the leaf. I did not examine it enough to ascertain whether it was the thrip or not, although I thought it looked like the thrip's work; but after the autumn rains came on we had such an open fall

that the celery took a start and grew very finely ; and we had a very fine crop of celery after all. I have not been in the habit of keeping it as Mr. Woodward suggests. I have no trouble in gettting at it. I put it in trenches, and when I take it up I keep plenty of soil at the root, and stand it up in the trenches. Then I take a couple of boards and put them over the top, lay a little straw over the boards, and there it keeps ; and we go and open it on any mild day and get any quantity of celery we want, and take it into the cellar and store it. We have often found it to grow in these trenches. Stalks grow up from the very root, and by spring there will be quite a growth of it.

Mr. WOODWARD.—We used to store our celery just as Mr. Beadle says, and it is not half the work to put it in the boxes that it is to put it in the trenches. And you do not have to wait for a warm day ; it is there any time. When it is very cold where I have my celery stored I throw mats over the boxes.

Mr. DEMPSEY.—I have never tried the cultivation of celery very extensively, but genally try to grow nearly enough for my family's supply. We find no difficulty in growing it. We select a piece of land that is capable of standing any drought, make it rich, and we find that we can get very nice celery. We cultivate just as Mr. Woodward speaks of, and we have been in the habit of packing it in the cellar. That has not a cement bottom —just an earth floor. We fill in with the earth we dig out with it—any earth, in fact. This system of watering is a novelty to me ; but a neighbour of mine had very nice celery this winter, which we were admiring, and he said that he simply packed it in his cellar in the fall just as we did, but he would go in occasionally and throw water over the top of it. He kept it almost saturated with water all the winter through. I had always thought too much water would rot the tops, but in this case it was just the opposite.

Mr. WOODWARD.—If the temperature happens to get up warm it will rot the tops, but if you keep water at the bottom to keep it moist it will be all right.

Mr. DEMPSEY.—I have seen it packed in straw for the winter, set up as Mr. Woodward says—close together, and with straw around it.

Mr. WOODWARD.—When we commence on a box it is just full, and it is pretty hard work to get it started. At first when you pull it out it is just like pulling out weeds that grow out of doors, but after you have once got it broken you can keep taking it out. The variety mostly used by us is Boston Market.

Mr. BEALL.—Those who have never grown celery in the black muck, and who have black muck in which they might do it, I would advise to try it, because celery is the most profitable vegetable you can grow if you have plenty of black muck. I can remember in our town, five or six years ago, when it was regularly sold at ten cents a root. For the last four or five years we can buy all we like, and it is generally eighteen or twenty inches long from the butt to the end of the leaf. It is grown in black muck. It is very easy to grow it. A lazy man can grow it. It sells now generally at from two to three cents a bunch.

Mr. GOTT.—Is it planted on the surface or in trenches ?

Mr. BEALL.—In trenches ; and there is no water. Even this last summer where we had about six weeks with scarcely any rain we noticed no difference—it grew right along in that particular sort of soil.

NEW VARIETIES OF POTATOES.

Mr. BUCKE, in opening a discussion on the question " Which of the new varieties of potatoes give promise of being valuable?" said : The only new variety of potatoes I know anything about is Mr. Dempsey's. I sent some of them to Keewatin to a man who is earliest out there. He came in the other day and told me that out of the pound of seed he had got he had obtained a yield of 81 pounds. The potatoes were very large indeed. Three pounds was a small one, he said. I thought that was a very good yield.

Mr. BEADLE.—Was it just one pound of seed ?

Mr. BUCKE.—It was the pound sent out by the Association.

Mr. DEMPSEY.—That was to be under two pounds.

Mr. BUCKE.—Mr. Dempsey's potato did very well with us. It is very nutty and nice in flavour. People who have raised it like it so well as a rule that they are not eating it; they are keeping it till next spring for seed.

Mr. WELLINGTON.—Potato growing is hardly in our line, but last year we grew the Beauty of Hebron, and this year we have set out the White Elephant. That is a late potato, and I think it is a potato that has come to stay. It is very large and very productive. It is white; the eyes are not deep set; and on cooking it, it has turned out remarkably well, being very floury and without any sogginess in even the largest specimens. We had one specimen this year—and it was not a very good year for potatoes either—which weighed two pounds and a half.

Mr. BEALL.—I had some of the Dempsey Seedling potatoes. I got a few more than the law allowed in the Fruit Growers' Association. I got them in another way. I had intended to have given them a very fair trial planted side by side with the Early Rose; for I cannot very well judge of the quality of a potato or of its productiveness but by comparison. I knew very well already what the Early Rose did for me. My land is not very well situated, I think, for potatoes, and when the dry weather came on the Early Rose soon failed—ripened early. The Dempsey potato continued green, but the rain kept off too long, and in due time the leaves gave way and died. I gathered the potatoes, and found a very fair crop. The Early Rose was not, I think, a third of a crop on account of the dry weather. If the Early Rose had produced in the same land as the Dempsey potato I should have said the Early Rose had given me a very fair crop. With regard to the qualities of the potato, I think I can sum them up very quickly. My Early Rose potatoes are sold. The Dempsey potato we are eating this winter. I think it will not be a favourite for some time—that is, until it is found out how to cook them. My wife tells me it is almost an impossibility to cook them; for you will either have them all broken open like flour or the heart not entirely cooked—they are so dry. We are much pleased with the potato, and for a long time I shall certainly not plant an Early Rose. The Dempsey potato will take its place. It is a better potato in flavour, and we like it in every particular. It resembles the Early Rose in shape, but it has a rougher skin It s a kidney potato. But the best feature about it is that the eyes are not sunken. It is the nearest to being smooth of any potato I ever saw. I never saw any other potato that I liked as well. I have had this year other potatoes that produced better, but they were in soil specially prepared. They were the Burbank Seedling.

Mr. HONSBERGER.—Although I cannot say that I am not a potato grower, I received from the Association the Dempsey Seedling, and gave it rather an indifferent trial. I was very much surprised at the results. I found it made a very rank growth. I am satisfied the land had no manure for at least five years, consequently the yield of potatoes was very light. I got for my crop about half a bushel, and from appearances they were very nice. I thought I should have just what I wanted in a potato—a medium sized one If I get an overgrown potato, I rather take it to the root-house for the cattle than store it for table use. This Dempsey Seedling is an almost perfectly smooth potato, and just about medium sized. Having so few of them I could not testify as to their quality; I want to give them another trial. I also tried the Burbank Seedling this year, and like it very much.

Mr. WOODWARD.—Varieties multiply rapidly, and about ninety-nine out of a hundred that are put out are hardly worth anything when you come to test them. It is very hard to find a potato that is better than the Early Rose, all things considered, although I do not consider the Early Rose a superior potato so far as quality is concerned. The Beauty of Hebron I call a very good potato. We have many potatoes that outyield it very much; but, all things considered, with us that is the best of all the new varieties I have tested. We have another potato, the Queen of the Valley, which is the heaviest yielder of any potato I have ever tried; but with me, this year, the quality is not up to what I expected.

Mr. BEADLE.—What do your people think of the Early Ohio?

Mr. WOODWARD.—The Early Ohio is very similar to the Early Rose.

Mr. DEMPSEY.—Does it ever grow hollow?

Mr. WOODWARD.—Yes; if it grows very large it does. There is one thing about the

White Elephant that I think very highly of; that is, this year it has been less subject to the attack of the potato beetle than an other potato I have ever seen grow. That insect will eat up other varieties around it and never touch it.

Mr. MORRIS.—I have grown the Dempsey potato. I can only speak of it in comparison with the Beauty of Hebron, the St. Patrick, and the White Elephant. The Beauty of Hebron is a very nice potato, one of the best in quality, I think, I have ever known; but it is a very shy cropper. The St. Patrick would come next in cropping, and the Dempsey would about compare with that. It is a far better cropper than the Beauty of Hebron. But the White Elephant outdistances the whole of them in cropping. I grew the White Elephant on three different pieces of ground. One was an old fence row. There they grew pointed. One specimen of them weighed three pound six ounces. Some that grew on another piece of ground grew as nice a shape as could be.

Mr. SAUNDERS.—I grew the Dempsey potato last year. I planted a row of them alongside the Early Rose, subject to the same treatment and in the same soil, and they yielded, I should judge, fully as much again in weight of crop, and the potatoes were a better size and smoother—better in every way. I found them very good indeed. I think that variety is a decided acquisition in the potato line. This last year was particularly unfavourable for growing potatoes with us.

Mr. BUCKE.—I think we are not going to have any potato come to stay with us. It seems to me that, after a few years, every potato we get runs out. Any person who can remember the potatoes of thirty or forty years ago will know that they are all gone. We are always requiring new varieties; and for my part, I have given up all idea of having any standard potato. I think any person who brings out a new potato deserves the thanks of the country for so doing.

Mr. WOODWARD.—Don't you think the Early Rose is just as good now as it ever was?

Mr. BUCKE.—Yes; I think it is. It has been in about ten years. I think in a few years it will disappear.

Mr. BEALL.—A year ago when I was here I spoke of a peculiarity connected with my Beauty of Hebrons—that is, that they were scabby—and I could not assign any reason for it. This year I got a few nice clean potatoes, and I put them in these sample rows where I put the Dempsey potatoes and the Early Rose. They had the same cultivation, the same manure, and the same treatment in every way, and they came out more scabby than ever. There was nothing of the kind on either of the other potatoes. I forgot to state that the Dempseys I raised were nearly all of medium size. I had not one perhaps as large as the quarter of the part of the seed I got.

Mr. BUCKE.—I think the scabbiness of the potatoes can easily be accounted for. There is only one true way to grow potatoes, and that is on sod. If they are grown on newly manured land they are sure to be scabby.

Mr. DEMPSEY.—This Dempsey potato that we have been speaking of is a seedling of my own. I showed in Hamilton—I think it was eight years ago last fall—two hundred varieties of new potatoes of my own production, and this is the only one that I thought worthy to continue in cultivation. It is a seedling of the Early Rose crossed with the Early Goodrich. The first year it was grown—I remember speaking of this before; and parties even questioned the truthfulness of my assertion—we obtained from seed the full-sized potato; but this variety was red throughout the inside as ever you saw a beet. We cultivated it the next year, and when we came to split the potatoes we saw that some of them were becoming whiter. We kept selecting the whiter potatoes, and it took us two or three years to establish the character it now possesses. I have compared it with several new varieties that I have had, and I have never found a variety that would beat it in yielding. I have never found a variety yet that will cook equal to it, and I feel perfectly satisfied still to stick to it. It was not sent out last year to make money; because it cost the parties nothing; and I have no object in making money out of it now. The potatoes are always a medium size; but the crop is abundant. They are always large enough for cooking purposes—I mean the large size. You scarcely find an overgrown one. They are ovate in form. The seed eyes are usually found only on one side of the potato, and very few in number. We had no trouble whatever in regard to

rotting or anything of that kind. We found the stalks grow very upright. It is an easy matter to hoe them—little danger of the whiffletrees of the horses or the edges of the teeth of your cultivator tearing them to pieces. We have tried the Beauty of Hebron—grown it beside other varieties; and certainly I think it is the best early potato I have tested. The Early Ohios do very well; but we find the most of them hollow. The Burbank Seedling I found to have the same defect as Col. Brooks' Ohio choke-cherry—"it wa' n't fit to eat."

REPORT OF COMMITTEE APPOINTED TO EXAMINE FRUITS ON EXHIBITION.

Mr. SAUNDERS presented the Report of the Committee on Fruits on Exhibition:

Mr. S. Fowler, of Cambray, exhibits two varieties of seedling apples under numbers one and two. No. 1 is about medium in size, of a yellow colour, with a brownish pink cheek with greyish brown specks, calyx much depressed and slightly ribbed, stem short and slender in a rather shallow cavity. Flesh moderately fine in texture, nearly white, juicy, sub-acid with a pleasant aroma and fair flavour, would probably prove a good cooker. No. 2 resembles No. 1 in form and colour, but is larger, flesh scarcely so fine as No. 1; juicy, sub-acid, and would doubtless cook well. Both of these seedlings are a little over-ripe to admit of their being properly judged as to character.

Messrs. Geo. Leslie & Son exhibit samples of the Blue Pearmain, which is said by Mr. Leslie to ship much better than any other variety of apple known to him, uniformly reaching their destination in good condition.

Mr. O. F. Smith, of Glanford, shows a handsome bright red seedling apple, about the size and colour of the Jonathan; flesh rather coarse, sweetish sub-acid. As it is rather over-ripe, it is difficult to judge of its true merits.

Mr. A. M. Smith, of St. Catharines, has on exhibition good samples of Lawrence Pear, in an excellent state of preservation, with their full flavour and juicy mellow character well developed.

Mr. S. Woodley, of Hamilton, exhibits fine samples of the following varieties of pears, all in good condition: Easter Beurre, Josephine de Malines and Winter Nelis.

Mr. Alexander Cowan, of Hamilton, exhibits some handsome specimens of fruits from Riverside, Southern California—gathered during a recent visit there. Beautiful clusters of oranges on the stem, with leaves attached, comprising Mediterranean Sweet orange, and the Navel orange. He also shows two varieties of lemons. These fruits are from trees grown by a Canadian settler named CHAFFEY, who settled in this district four years ago. A very fine box of California raisins is also shown prepared from grapes grown in the same vicinity.

Four samples of very good wines are also shown by the same gentleman, consisting of Sherry, Port, Jasens wine made from Muscat grapes, the variety used for making raisins, also a wine known as Cucamonga wine; your Committee, think that the Sherry is the finest of the four wines exhibited.

WM. SAUNDERS,
S. D. WILLARD,
ALEX. McD. ALLAN.

MELONS.

Mr. A. M. SMITH, in speaking on the subject of melons and best methods of cultivation said: I do not grow but about three varieties at present. The only musk-melon I grow is one that I got the seed of from Washington, called the Hunter melon. It is a large, long, rough-skinned green-flesh melon of very fine quality, and I have grown it for several years. When I was located at Drummondville I supplied the principal hotels about

the Falls with it ; and they told me it was the best melon we could get hold of. I grow that exclusively as a musk-melon. Of water-melons I grow principally now a variety that is called, I think, Haskell's Excelsior. It is a large-sized, mottled melon of very good quality. I tried this year a new one called the Cuban Queen. It is said to be of enormous size, though this last season it was so dry that it did not grow with me very large. I think the largest one I had weighed about 25 pounds. They claim to have raised it in the States to weigh 80 pounds. It is a red-flesh, very fine melon, and very thin-skinned. It would be a very fine melon for amateurs ; but it is rather tender to handle for shipping. I have tried the Mountain Sweet, which is a very good melon. The Gypsy is a very large melon, but a little too late for this climate. I find the Excelsior is hardly equal to it in size ; but it is earlier, and in quality fully as good. With regard to the method of cultivation, I generally make my land as rich as possible. I do not know that you can get it too rich for melons. The great secret in growing them is to keep them cultivated ; if you hoe them every other day it is to their benefit.

Mr. GOTT.—Do you manure the whole surface of the ground, or simply the hills where the roots are ?

Mr. SMITH.—I put the manure in the hill.

Mr. BUCKE.—How early do you have them ?

Mr. SMITH.—Generally about the middle of August, sometimes a little earlier, and sometimes a little later. It depends upon the location.

Mr. GOTT.—What distance do you plant apart, and do you practice pruning the vines ?

Mr. SMITH.—No ; I never practice pruning to any extent. In the last hoeing, if some of the leaders are getting out a little too long, I sometimes crop them off with the hoe. I generally put them from seven to eight feet apart.

Mr. BUCKE.—Do you allow them to fertilize naturally ; or do you assist fertilization ?

Mr. SMITH.—Just naturally.

Mr. BEADLE.—It is claimed by some that if you will pinch the running vine after it starts out and has got to be two or three feet in length, and compel it to branch, you will get fruit much earlier, it will set much earlier than if you allow it to run on until it sets its fruit. I thought perhaps Mr. Smith would throw some light upon that point.

Mr. DEMPSEY.—I have tried pruning in that way. We generally pinch the ends when they start to run, particularly in the musk-melons. Some growers pretend that it pays to pinch the vine before it starts to run, and that several branches will start from the same plant ; but I think it pays better to let it run about twelve inches or something near that. Some will be eighteen and some six inches, because when we go there to pinch them we don't do it all at once. That induces laterals to start out from every joint. I have seen stems that were not pinched run six or eight feet before there would be a blossom that would produce fruit, and then if it was not pinched that fruit would fail. We do not prune them, only pinch the tip. All of the fruit would lie then near the roots. The hills we plant generally eight feet apart, which gives ample room to get around your hill ; and it is none too much space either, from the fact that you will find if you examine the soil that these roots actually meet, and in fact more than meet—they cross each other. The whole of the soil will be occupied a little below the surface of the musk-melon land with the roots. Consequently it will be necessary to fertilize the whole of the land. I do not like too high manuring for melon culture. We simply use a handful of salt in the hole, and a little ashes. Gypsum is a very good thing, and we like it and some bone dust. We do not use much stable manure for our musk-melons. For water-melons we generally use superphosphate—just a handful of it. I would rather have a loose, sandy soil than a very rich loamy soil to grow water-melons. If you are going to be successful in growing water-melons you must select a very warm spot. If possible, select a piece of ground that is protected from the north and west. Cultivated on such soil I find no difficulty whatever in obtaining melons of large size and delicious flavour ; and they ripen sufficiently early. I never saw a man cultivate his melons too much. It will pay to cultivate them every day, if it can be done—the soil between them. The musk-melon should never be cultivated deep, however, after they begin to vine, from the fact that the roots run very close to the surface, and they do not require any root-

pruning. For water-melons you can cultivate deeper; you will find the roots penetrate deeper into the soil. I have seen Long Island melons and Black Spanish melons on soil that would not grow a good crop of Indian corn, that would weigh more than thirty pounds. We have a piece of land that is a sand hill—actually a drifting sand, you may say—and I remember picking one melon on it, a couple of years ago, that was all I could carry to the house conveniently. I am satisfied it is not manure nor strong soil we want to produce good water-melons, but heat and cultivation.

Mr. BEADLE.—Why so much cultivation?

Mr. DEMPSEY.—They are like all other crops that we cultivate on a warm soil. All warm soil is inclined to be a dry soil, and the oftener we stir it the opener we will keep it; and by that means the atmospheric air is enabled to penetrate the ground, and to maintain a certain amount of moisture without the amount of cold being admitted that there would be if we applied water to it. I ask for no better water-melon on my table than the Mountain Sweet; but I find there is more money in the Black Spanish than in any other variety I have tried. It will yield more weight than any other we have, and will ship better than any other melon. The skin is rather thick. We cannot barrel the Long Island safely for shipping. We find that a great many of them and of the Mountain Sweet have broken, so we usually ship the Black Spanish. The Hunter musk-melon is a large melon that is liable to grow crooked if you are not careful to turn it over, and one side will be thin; but it is a very fine-flavoured green-flesh melon. It is one of the finest melons to supply a hotel with that I have ever seen. It will produce a greater weight per acre than any other melon I have ever seen. We cultivate Skillman's fine netted melon also, a musk-melon. It is an early melon, very reliable; and you will generally find, if they are properly cultivated, that there are no bad ones among them. The Nutmegs we cultivate sometimes; but they are variable in their flavour.

Mr. A. M. SMITH.—In regard to this sandy hill—don't you manure pretty liberally in order to get good water-melons out of it?

Mr. DEMPSEY.—No. We usually sow broadcast from a barrel to two barrels of common salt to the acre; and then we plough the soil. It is better to plough the soil three or four times before planting the seed—not be in too great a hurry in getting it in in the spring; let the soil get warm. Apart from the salt we apply a handful of the superphosphate of lime. If we have not that we use the bone dust and ashes. We grow a great deal better melons where we use the salt than where we do not. The salt helps to retain the moisture.

Mr. BEALL.—Isn't your land new where you grow the melons?

Mr. DEMPSEY.—I was told by an old man who worked for me that right on that spot he recollected cutting wheat that yielded forty bushels to the acre more than forty years ago. It is soil that has never been in the hands of parties that had enterprize enough to draw a load of manure on it. When I moved on it, all the manure was lying at the barn. I presume it may have had a little manure dropped on it occasionally; but I do not think it had had a load of manure on it for forty years. It actually failed to produce rye and buckwheat.

Mr. GOTT.—Could you give us any information as to the profitableness of this crop, and as to the amount to be produced?

Mr. DEMPSEY.—It is a very profitable crop if you have a market for it. We have sometimes produced such quantities of water-melons that the truth in regard to them would appear unreasonable. We had a couple of acres of them four years ago, and the yield that year was so great that we could drive a two-horse waggon into the patch and load it with water-melons, without stirring the waggon, one or two men outside passing them to a man in the waggon, and he laying them round. It was a two-ton load at that. The waggon box was made wide so that it would hold fifty bushels of potatoes, and we would round it up with melons without stirring the waggon.

Mr. BEADLE.—How do you market them—by the ton?

Mr. DEMPSEY.—No; by the piece. Parties generally order a certain number of melons of about such a weight.

Mr. ORR.—How far do you have to take them before reaching cars or boat?

Mr. DEMPSEY.—Twelve or fifteen miles.

Mr. BEALL.—I want to ask the President whether he sowed the seed in the ground where the melons grew, or put it in hot-beds?

Mr. DEMPSEY.—Invariably sowed it in the ground where they grew. Usually we begin to pick our melons about September, and no matter how early the season is, we never think of planting the seed until along in June. They begin to vine in about six weeks, and by forcing them on they grow very fast.

It being now six o'clock, the convention adjourned till half-past seven.

CORN FOR TABLE USE.

In speaking to the question, as to what are the best varieties of corn for table use,

Mr. BEADLE said: I think the sweet corn is the best for table use. Then the question is, which sweet corn? I know that our yellow corn is a very good variety of corn. It continues a short season, and makes very fine, sweet meal; and it is passable eating when green. But our renowned sweet corn is altogether preferable. I find the variety known as the Minnesota sweet corn the earliest. I have tried a sweet corn raised in Vermont, which I find about as early. It is sometimes grown in the eastern counties of Quebec. It ripens about the same time as the Minnesota, and I cannot see any material difference between the two varieties in quality. Then we have Crosby's early sweet corn, which we like very well. I think it a little richer, a little sweeter than the Minnesota. Then there was an Egyptian sweet corn. I have grown that; but I do not like it. It is not sweet enough to suit me. It gets in late, which is perhaps an advantage. And yet, to me, that is no advantage; I can keep the other corn just as late, by planting it a little later. Then we had Stowell's Evergreen. It does not get hard, and it is, in that sense, an evergreen corn that remains fit for table use a considerable time. But I do not consider that of the highest quality. I can just as well have one of these other varieties of sweet corn that is richer by planting it later. I do not see anything gained by multiplicity of kinds. I believe, however, that for canning purposes, for winter use, these later varieties are preferable. Perhaps one reason is, that the ears are larger; you get more corn on the cob, and probably can do the work more rapidly. Stowell's Evergreen is so called, because it is in use for a long time; in fact, stays green until the frost appears.

Mr. BUCKE.—A very large cob?

Mr. BEADLE.—Yes. There is not much difference, to my taste, between that and the Egyptian.

Mr. BEALL.—We grow corn. I was trying very hard, just now, to think of the kinds we grow; but there is one kind I cannot think of the name of. It has a long, yellow ear. However, we grow the early Minnesota and the Stowell's Evergreen; and this other one comes in between the two. We generally grow four kinds in the year. We generally take one other new kind; but we invariably come back to the three old ones, and the new one we generally pass aside. This year I had a couple of ears of Chief Johnson's corn, and I must say that, when it was exactly in the right season, it was exceedingly good. We liked it as well as any corn we ever had. But a great drawback to it was this, that after three or four days—perhaps not longer than a week—we had not any of it to eat; it was too dry. Another objection to it was, that it was certainly the most rampageous corn I ever saw—most immoral corn; for it impregnated almost every other corn I had. It discoloured their seeds.

Mr. WOODWARD.—We grow Minnesota for early. Although it is not very sweet, it is about the earliest I think we have. Then we grow Stowell's Evergreen; and then we have a corn that we call California Sweet Corn. It is much larger than the Stowell, and more prolific. It does not grow quite as early. I think the finest corn I have ever eaten, I ate last summer in New Jersey. It was a black sugar corn; I forget the name of it—rather darker than Chief Johnston's corn; it was quite black before it was cooked. When it was cooked it paled out a little. It is not as early as the Minnesota, but about next to it. E. Williams, Mount Clair, is the gentleman at whose place I ate it.

Mr. WILLARD.—I grow the same corns that Mr. Woodward does. I think a great deal of that large late corn, that he speaks of. I think a person would enjoy eating it better than any other corn, on account of its coming in later. You get a larger mouthful of it.

PEACHES FOR MARKET.

The next topic discussed was, "Best Varieties of Peaches for Market, ripening so as to give a continuous supply during the season."

Mr. GOTT.—The earliest peach that we have is the Alexander, Amsden's June, or Early Canada. We consider these three varieties to be identical, inasmuch as if you put the ripened fruit into a basket and shake it up, you cannot pick out the different kinds again. The trees too are very similar. I do not mean to say that they are identical, but they appear so to us. Another peach that we have is the Early Louise. It is one of Mr. Rivers' peaches, from England. It is an excellent peach. The next profitable peach that we have, coming in after those, is Rivers' Early. It is a peach for the million. With us, it stands in the same relationship to peaches in general, as the Concord grape stands to the grape family. It is emphatically the peach. We consider it to be the standard of all other peaches. Crawford's Late is an excellent peach, possessed of many valuable qualities. It is large sized and of beautiful colour; the trees are hardy—fully as much so as the Early; and the fruit appears to be worth more—it is better adapted to our markets. The worst feature of Crawford's Early is, that it comes to the glut—usually at the time our seedling peaches are in the market. But a good peach will sell at any time, glut or no glut. There are several peaches coming in after these. The peach called Stump-the-World is one of them. It is possessed of a great deal of value. It is an excellent peach for exhibition purposes, coming in for our fall shows, when all the other peaches are done. The peach called Foster is, in every way, I think, a model peach. If there is any possibility of beating Crawford's Early that does it. Another peach which we have grown, but of whose qualities we could not say very much, is the Lemon Cling. It is a very yellow peach. It has a very fine colour—looks well; but it is almost an impossibility to get it off the stone.

Mr. PETTIT.—There are several important varieties that Mr. Gott has left out. I would plant first the Alexander. It is a very fine peach, and comes into bearing young. After that, the Early Rivers. It is not a peach that will stand shipping very well; but it is a fine peach, and sells well. After that, the Hale's Early. It is not much of a peach, and it has had a good deal of abuse; but it bears such quantities, and so regularly, that I think it will produce as much money as any other peach. After that, the Crawford's Early. That, I think, in our section, we have run too heavily on. It comes in with so much other fruit, and with so many other varieties of peaches, that it sells pretty low sometimes; altogether, it is such an excellent peach that no other variety would stand the quantity in the market that it would. After that, the Old Mixon, a fine peach, which always commands a good place, and is a good shipper. Then the Lemon Cling. It is an excellent shipper and very heavy bearer. After that, the Smock, an excellent bearer and one that comes in after the glut is over, and always commands a good price. Then comes the Salway. It is a little later; but it is a good peach.

Mr. MORRIS.—The Mountain Rose is left out. It would follow the Hale's Early, and then after that comes the Early York. I think those are as good as any.

Mr. BIGGAR.—Our friends have omitted a very excellent peach, the Morris' White. People are getting to know it now. I remember, a few years ago, it was hardly saleable in the market. Now there is a great deal of call for it, and you can hardly supply the demand for that variety. I would not be without it.

Mr. HONSBERGER.—My experience is not very extensive in peach growing. The Early Canada, the Alexander, and the Amsden's June are the earliest I grow, It would be like a grasp in the dark for me to choose between them. After them I grow the Early Rivers; after that comes the Early Beatrice, although a great deal is said against it. I find it in my orchard a little under-sized. It is a peach that is highly coloured,

and is a longer time in ripening than most peaches. The Early Rivers is a very nice peach; but I do not find it as profitable for a distant market as for a local market. For a local market there is nothing to excel it at that time. With me the Early Louise follows. It is a very nice peach; but I do not find it very profitable. Then comes in the Crawford. I have no Hale's, because they do not succeed with me. I find the Foster takes a few days the start of the Crawfords with me. The Crawford follows it. Then would come in the Mountain Rose and the Sweetwater. Those two are my favourite peaches for canning, above all the peaches that I have grown yet. Then would follow the Barnard, which is a very profitable peach if not allowed to bear too heavily. They want a great deal of thinning. It is just a medium-sized peach. It is very handsome. I think a great deal of it in the orchard. Then I have the Late Crawford, which I think a great deal of. The Old Mixon paid me better this season than any tree I had. Morris' White I find a little too small to be profitable. The Lemon Cling is a peach that a great many find a great deal of fault with; but for my part I would not want to be without some of them. They are a peach that come in in a good time, and I have found them to sell for a higher price for the last three years than Crawford's Early. Then I have the Smock, which I like very much. It comes in at a time when it has very little opposition, and generally fetches good prices. The latest I have is the Salway; but I would not want to plant very extensively of it, as it is a little too late to risk.

A MEMBER.—Have you found the Salway ripen with you as well the last year or two?

Mr. HONSBERGER.—It has ripened thoroughly the last three years with me.

A MEMBER.—What do you think of the quality of it?

Mr. HONSBERGER.—It is very good when thoroughly ripe.

Mr. BIGGAR.—Does anyone know anything about the Boisole's Late? It is a very good peach and a hardy one.

Mr. GOTT.—The Early Barnard is one of our best peaches, very profitable and every way acceptable. There was another peach that was sent out some time ago by Mr. Barnard, called Early Melocoton, which is a good one. There is another peach grown up our way, called the Black Peach. The flesh is a dark pink colour, as though the whole thing from centre to circumference were stained with blood.

Judge MACPHERSON.—We grow a few peaches at Owen Sound. I had one last year, I know. There have been some very good ones grown there. The Early Crawford grows very well. But it is not a peach-growing country there, nor has much attention been paid to peach-growing in that section yet. Some places along the shore they grow them every year, and succeed very well.

Mr. SAUNDERS.—I did not get even one peach last year from my place. The winter was too hard on the trees.

Mr. WILLARD.—I have been interested in listening to the ideas brought out with regard to the qualities of the peaches that have been mentioned. I have grown peaches somewhat myself; but I have found that the early peaches and the late peaches have paid me best. I do not think I have had any that have paid me as well as the Amsden. I can see no perceptable difference, however, between the Amsden, the Alexander, the Wilder, and the Waterloo. I think there is a little difference in the period of ripening in some of these varieties that are so closely connected together; but I think that difference, and perhaps the difference in the quality, is attributable some to the soil on which they are grown and the age of the trees. Mr. Barry, whom we regard as an authority on almost all of our fruits, has claimed that the Waterloo was earlier than almost any of these early peaches by a week at least. Now, I found the Waterloo on my ground this year to ripen with the latest of the Amsdens. I shipped the Amsdens for about ten days, and I found the Waterloo and the Wilder came in with the latest of these Amsdens. I have found the Rivers to be with us a very valuable peach. It has been one of the best that I have grown, but not entirely fit for long shipments because of its very tender flesh. It is the best, I think, of those peaches that Mr. Rivers has sent out. Speaking of it with regard to quality, you will invariably find the Rivers best on the south side of the tree. Perhaps that may be accounted for in a measure by the very marked character of the foliage, which is sometimes almost like that of a Lombardy poplar. In consequence

the fruit is shaded a good deal. I have fruited the Hale's July. It is a peach that stood the severity of the winter of 1875, when almost all the peach orchards on the shores of Lake Michigan were destroyed. It is a very fine yellow-meated peach. My wife thinks there is nothing like it for canning. But it has its imperfections. It is a tree that will over-bear; and it must be thinned thoroughly. This year, in order to have good fruit, I had my man thin it three times. It may bear every year, and bear profusely; but in order to get good specimens of fruit you must thin it thoroughly. While the Crawfords sold in our market for two dollars a bushel this year, the Hale's July sold for three, on account of its quality and on account of the glut being off the market. After that we found the Smock just what we wanted; and after that the Salway. There have been a great many objections raised to the Salway, and perhaps justly. Mr. Elwanger said, in one of our meetings, that he had failed to ripen it at Rochester; but it has ripened now for three seasons, and has been sent to Philadelphia and Boston and sold for four dollars a bushel. Its keeping qualities are wonderful, and in favourite localities where you are sure of ripening it well, I believe it is an acquisition.

Mr. WOODWARD.—There is one thing I would like to see—that is, a man who can tell the difference between a basket of Amsdens, one of Alexanders, one of Early Canada, and one of Waterloo peaches; and I would like to see another man who can tell the difference between Early Crawfords, Foster, or Allen's peach. I think that of all the early peaches there was nothing that, with judicious care, we used to get so much money out of, when we were in the business, as we did out of the Early Beatrice. It is the handsomest of all the early shippers. It is as good a keeper as any of the early shippers. There is but one objection you can raise against it, and that is as to its size; but if you thin out your trees you can get it up in such shape that it will sell with any of the peaches. There is another peach that I used to grow a little, that is, Hand's Early Golden. It comes a little later than the Crawford. It is a better peach than the Crawford—a better grower—not as good a bearer, but a very good peach. The Salway, where you can ripen it, is one of the finest peaches you can have, and it is a good keeper. I have seen them repeatedly kept until along in December. Wherever it will ripen it is a peach that is profitable.

Mr. A. M. SMITH.—I would like to endorse what Mr. Woodward said in regard to the Early Beatrice. We have some three or four young trees of it; and as a shipper I consider it ahead of the Rivers, though the size is against it. If, however, it is properly thinned out it is a profitable peach, and it is sure to bear every year. In regard to the difference between the Foster, Early Crawford, and Allen peaches, I would not say that I could tell the difference between the Foster and the Early Crawford; but if the Allen peach that Mr. Woodward refers to is the one that I have in my mind, it is as distinct from the Crawford as the Spitzenburg apple is from the Baldwin. In the first place, the Allen peach is a week later than the Crawford; it is a rounder peach, and has a great deal deeper colour.

Mr. WILLARD.—The Wager is a fine canning peach. It comes in between the Crawfords. It is exciting a good deal of interest among peach growers in our section at the present time.

Mr. A. M. SMITH.—Some parties consider this Wager and the Allen identical peaches.

Mr. WOODWARD.—The Mountain Rose, for a not too distant market, is a very profitable peach. It is the only one of the white peaches, not too early, I would advise any man to plant. I consider it the best of all the peaches to can.

Mr. GOTT.—The Mountain Rose is with us one of the best peaches that we have, and one of the most profitable. We can almost universally sell them for as good a price as we can the yellow flesh ones. With us the Amsden's June is picked first of the three mentioned by Mr. Woodward.

Mr. BEADLE.—I would like to ask Mr. Willard if he knows anything of Reeve's Favourite?

Mr. WILLARD.—I only know of it from what I have seen in Delaware. I saw it fruit in Delaware some few years since, and the impression I formed of it was very favourable indeed.

Mr. BEADLE.—I have an idea that it ripens about the time of the Wager peach. It is a yellow-fleshed peach of a very good quality, a good bearer, good size and appearance. I have not fruited it myself

Mr. MORRIS.—There are a good many of that variety fruited in our section, and I think the fruit is the largest that we have. It ripens a little before the Late Crawfords.

Mr. BEADLE.—What do you think of the quality of the peaches?

Mr. MORRIS.—Very good.

Mr. WILLARD.—We have none of the yellows where I live; but knowing that they have them in almost every section, it seems to me that those engaged in the work of arresting the progress of the disease should ferret out and let it be generally known what peaches are less liable to the yellows than others. There must be some such grown at the present time.

Mr. BEADLE.—I think that last winter Mr. Woodward told us that in his peach orchard—which was worth a good deal once, but is worth hardly anything now—there was one variety that escaped the disease.

Mr. WOODWARD.—That is so. This last year that same variety remained free from the yellows. I would not like to say it is exempt until I have tested it further. I do not know what the name of it is. It is a better peach than the Crawford. It is a round, dark peach, a deep yellow, and a larger peach than the Crawford, a good, strong grower.

PEACHES FOR CANNING AND DRYING.

Mr. GOTT.—It has already been said that the Mountain Rose has excellent qualities for canning. We have a peach—I do not know whether it is very generally known—which we call Hall's Beauty. It is a very solid peach, not very large, but for canning purposes it is first-class. For drying, we consider that our seedlings answer every purpose.

Mr. BEADLE.—I came away from the Rochester meeting with this impression on my mind—that the white-fleshed peaches have been used of late years by those who dry and those who can peaches because of their handsome appearance when put up—because they are more attractive to buyers than the yellow peaches. It is not that they possess any particular qualities that make them dry any easier or better, or because they can better, or are any richer. With regard to the seedling peaches, I do not know to what market my friend sends those he dries; but I think that no person who has an educated taste with regard to peaches would ever buy his Seedling peaches dried if he could get these other varieties.

Mr. WOODWARD.—We had one dryer in our town who told me not long ago that he would take all the Mountain Rose peaches he could get, and agree to run his evaporator night and day throughout the season, and would pay seventy-five cents a bushel for them. He said he thought he could not begin to supply the demand for them, and that the people would not take anything but that variety. He said there was twice the money in them that there was in any other variety that he had ever dried.

EFFECTS OF THE PAST WINTER ON FRUIT TREES, ETC.

The next topic discussed was, "The effect of last winter on fruit trees, grape vines, and small fruits."

Mr. BUCKE.—I can bear testimony that last winter was the best winter we ever had for fruit trees. We had more blue plums this year than we ever had before; and we did not loose any fruits at all from the effects of the severity of the winter. Up here the winter was so severe that they thought we in Ottawa were all going to be killed out; but we never before had so much fruit as we have had this year. We had more

and better plums than we ever had before. I do not think we had it lower than 35° below zero last year.

Mr. SAUNDERS.—We were not so fortunate in the London district. My registering thermometer registered 26° below zero. The mercury got to the end of the tube, and I do not know how much farther it would have gone—I presume down to 32° or 33°. The result was that it killed nearly all the plum trees in our section dead, or so nearly dead that a few of them have struggled along here and there, making a very insignificant growth, and died towards the end of the year—those that did not die in the winter. I have not noticed any of the wild plums in the woods killed; but I think all the cultivated varieties suffered, except in the city, where the trees were protected by houses. We found some of our ornamental trees killed outright also. When the thermometer has not been so low as that, we have usually lost some of our peach trees; but last year the peach trees survived where the plum trees were killed standing alongside of them. The same might be said about some other varieties of fruit that are usually considered tender. In grapes, for instance, although my friend Arnold's grapes have usually been hardy, yet in one location on my grounds they were killed outright. The same varieties within a hundred yards, not so much exposed, survived, and made a good growth this year. Some of the cherries were very much injured. I lost several trees. They seemed to make a little start in the spring, and then died out. But it did not affect the cherries in the same disastrous way as the plums. Most of them survived.

Mr. WILLARD.—Had the plum trees to which you refer generally half a crop the previous season?

Mr. SAUNDERS.—The previous season these trees of mine had a very light crop on. This would have been the fifth year if they had survived.

Mr. WOODWARD.—Did not your plum trees, a year ago this last summer, lose their leaves in that drought, and did not they start out with their leaves when the warm weather came in the fall?

Mr. SAUNDERS.—They lost their leaves quite early in the season, but their buds did not start out again to any extent in the fall.

Mr. WILLARD.—I think the losing of their leaves then weakened the trees, and that then the severe weather last winter worked the disastrous effect on them.

Mr. WOODWARD.—I believe it was not last winter, but the severe weather a year ago last November that killed Mr. Saunders' trees. The sap was in the trees, and the frost caught them and killed them with ease. I was up in Ohio last fall, the first of December, and I saw grape vines there at the winter meeting by the armful, and you might examine them and not find a live bud in a thousand—they were killed. We had it down to zero in December, and they had it down there to five, six, and ten below zero. I never saw such extreme cold in November as we had then. It did not affect the peach, because the peach was done ripening; it was in entire rest in November when the frost came.

Mr. BEADLE.—I think Mr. Bucke's trees are natives, are they not?

Mr. BUCKE.—The only really cultivated plum tree I have is the Orange Gage.

Judge MACPHERSON.—As far as Owen Sound is concerned, we had a frost in June that killed a greater portion of the outdoor grapes and plums. I do not think the November frost affected us. My recollection is that we had snow on the front then, and that it continued through the whole winter. We had very severe weather in the winter, sometimes 35 and 36, I think, and a great deal of snow, but I do not think the trees were injured by the winter at all. Mr. Roy was so singularly fortunate that all his grapes did well this year. Mr. Holmes, who lives on the other side of the bay from Mr. Roy, some little distance from the water, had as fine a crop of plums as you will ordinarily see. There were a few other places where they were successful in raising plums, but the greater portion of the plums and grapes were killed by that frost, and in fact all other trees, even the Canada thistles were cut down by it, but I do not think the severe winter affected them at all. Probably the reason for the difference is that in this part of the country there is not so much snow as at Ottawa or Owen Sound, or it may be that owing to having warm weather here the trees had commenced to bud out again.

Mr. ARNOLD.—I feel somewhat inclined to endorse the theory of Mr. Woodward as to the November frost. I think the cold came upon us so suddenly that the trees were

not prepared for it. My plum trees were killed—three-fourths of them—both in the nursery and in the orchard; and it was not because they had a very heavy crop the year before. As for the grapes, they bore a slight crop. They were never worse covered than they were last winter; and I was not looking for any. All my cherries that are worked on the Mazzard stock were killed; and I do not know of a single instance where they were grafted on the Mahaleb stock that they were killed, and they were growing side by side. My theory of the peaches being killed is that, in the Indian summer we have, the buds, after the foliage has been off some time, become swollen by the warm weather, and are thus destroyed. A warm fall is almost sure to kill the peach buds with me.

Mr. GOTT.—Last winter was considered the most disastrous winter that we have come through for a number of years. In some places it affected the apple trees, though just in our immediate neighbourhood we have had one of the finest crops we have had for several years. Our plums were considerably affected—some varieties especially. The cherries were killed outright, especially those belonging to the Heart varieties. In grapes it pointed out to us those varieties that would kill down by frost. The Rebecca was killed to the gound, as was also the Isabella. The Eumelan was killed also very badly. The Rogers' No. 3 was killed entirely down to the ground. The Adirondac was killed so that it scarcely recovered any foliage from the old wood. The Salem was very badly killed so that it bore no fruit. The Iona was injured to a certain extent so that the fruit amounted to very little. Around the town of Strathroy the peaches were killed outright. We lost no peach wood; but we lost all our fruits. The Balsam buds were killed by the winter's cold.

Mr. BEALL.—I can scarcely think that the cold through the winter, although it was such a severe winter, did the injury that has been attributed to it, because with us it is supposed to be a cold climate, and I have not heard of a solitary thing having been killed in the neighbourhood—not even shrubs. I find that the lowest temperature we had was about 28 below zero; and that was on the second of February. Now, it is possible that Mr. Woodward's theory is correct, and if it is I can account for the effects being wanting at Ottawa as Mr. Bucke says they were. It is quite possible that Mr. Woodward's theory is correct; because the cold wave that we had at that time in November—that is from the 16th to the 26th—was to the south of us principally. At Erie, in Pennsylvania, the thermometer went down eight or nine degrees lower than at Toronto. The intense cold was to the south of us, I find that with us the thermometer registered nearly ten degrees below zero on the 24th of November, and still nothing was injured. I think the solution of the question can only be found in a better knowledge of meteorology, and that the Fruit Growers' Association should take means to get more knowledge on that subject. I think it would be to the interest of the fruit growers if comparative statements were obtained and published every year from certain given localities relative to the weather. It would assist in giving us knowledge which we do not possess now, and can not possibly possess.

Mr. WOODWARD.—The first frost that we had at Lockport, I remember distinctly, was on the 6th day of November. I remember taking grapes off the vine that day plump and nice, and up to the time we had that severe weather there had not been frost enough to drop the leaves from the trees, while at Ottawa, and at Mr. Beall's place, I have no doubt it would be different entirely, and the same temperature would not kill there that killed with us. I remember being in a plum orchard on the 9th day of December, and a gentleman was showing me his plum trees. It was at Adrian, Michigan. I took out my knife and cut a tree, and said to him, "your trees are killed." They had dropped their leaves, and then when the warm wet weather had come on they had started out, and many of the trees had young leaves on them as large as a mouse's ears, and they were frozen up in that succulent state.

Mr. DEMPSEY.—Although the winter was very severe with us we suffered very little. The frost in November came upon us so early that we had only got our trees properly covered over. The first frost was the first one that killed anything. There were only a couple of varieties of apples that I noticed to be affected at all by the cold winter, and strange to tell you they were Russian varieties. Our plums stood the severity of the winter very well, and blossomed in the spring, but we had no fruit; of course the frost

in November happened to strike our grapes at that time before we got them laid down. We dare not attempt to winter them on trellises. Our grapes must be laid down every fall, consequently we suffered severely with our grapes. Some varieties, however, did not get killed. We would find that one variety in a certain locality had suffered scarcely any, while the same variety was frozen to death forty rods away. Among my own seedlings I noticed that in one place the Burnet was frozen dead, and my number 25 produced, although it was not laid down during the winter; and in another place it was just the reverse. We never had our small fruits winter so well. The most tender varieties of raspberries came through the winter perfectly, and we did not lay them down. However, I believe you had a more severe winter here than we had farther east. We did not have that June frost on our own place, but within a mile of us they suffered severely. Our places are both protected, one by elevation, and the other by being beside water.

MOST PROFITABLE PEARS.

On the question of which are the most profitable varieties of pears for market,

MR. A. M. SMITH, said:—I think the most profitable variety for our section is the Bartlett.

MR. BEADLE.—I would like to draw out an answer to this question:—Do any of the pear trees pay? It is really getting to be a question whether they do or not when we look at the destruction which the pear blight has occasioned to our pear orchards. I have been talking to some pear tree planters in our vicinity, and they are about giving it up in despair. They say they do no more than get their orchard in nice paying condition than the blight comes and kills the trees, One gentleman told me he was replacing his pear trees, as fast as the blight killed them, with plums. If this is the experience of pear tree growers generally we have to wait perhaps until we get trees that are blight-proof, or nearly so, before we can make pear orchards profitable. I remember talking to a Mr. Townsend in Lockport a good many years ago, and telling him that I had come to his place on purpose to see his pear orchard. "Well," said he, "you cannot see it. I can show you where the pear orchard was, but it is not there now. The blight has been there and killed nine-tenths of the trees, and a great many of the dead trees are still there." "Well," said I, "what do you think about it?" "Oh," said he, "I think it has paid me very well for the investment;"—whether he ever planted another pear orchard and ran the risk of the pear blight I do not know.

MR. GOTT.—The first pear, in my opinion, is the Bartlett. It always commands a good price. The next one that we find very profitable as a market pear is the Flemish Beauty. It is very popular. Another pear that we have that is very profitable and sells well in the market is the Louise Bonne De Jersey. Another pear that we are testing, and that we consider to have valuable qualities, is a combination of the two first I have named, called the Clapp's Favourite. It is a very fine pear to look at, and will sell very well. It seems to be a little shy in bearing. It must not be allowed to get too ripe. A very good pear for market purposes, and which will command a good price, is the Easter Beurre. Then comes the Lawrence. The Seckel is considered ahead of the last in selling value; but to say that it is profitable in the market is quite another thing. It is not profitable with us. We have had little or no experience with the blight. I do not know of an orchard in our section of the country that is suffering from it. I hardly know how to account for that.

MR. ORR.—I have between one and two hundred pear trees out, most of them set out within the last five years. There are about fourteen or twenty that are about fourteen years old. They have been bearing abundantly since they were six years old, but the Bartletts were blighted this summer. I think the Flemish Beauty the most profitable. The Bartlett commands the best price, but the Flemish beauty bears twice as much as the Bartlett. The soil where the Bartlett blighted is sand. Where the Bartletts are doing well, and where the Flemish Beauties are, is a loam with heavy red clay subsoil.

MR. WILLARD.—I believe the cause of peach yellow, if ever ascertained, will be found to be the same as that which produces the blight in the pear. I believe that the investigation that is now going on in the minds of some of our scientific men in the country, as well as in the minds of men who are practical, is going to result in giving us ultimately varieties of pears that will be more or less free from the blight, while at the same time combining productiveness to a sufficient degree to make them profitable. As I said with regard to grapes this morning, I am a great stickler for blood, and I believe we have to look in a measure to something that gets back near to the seedling for a variety of pear that is not only going to be free from blight, but also to be sufficiently productive to be profitable. I believe that the Seckel is one of those varieties that to a very great extent throughout the United States is free from blight. I have never seen a pear called the Doctor Reeder blight, although I have seen it surrounded by trees that blighted to the ground.

A MEMBER.—Hear, hear; that is so.

MR. WILLARD.—The wood of the Doctor Reeder is very rugged, showing a ruggedness of constitution which abundantly fits it to resist disease. I have a list here of varieties which I have found to be quite free from blight. The Sterling is one which, I find, has never blighted in Michigan. The Seckel I have mentioned. The Rutter, a pear which originated in the vicinity of Philadelphia, shows by its growth that it has a rugged constitution. I have seen the Bartlett, the Flemish Beauty, and the Clapp's Favourite on my own ground blight around the Rutter, while I have never seen the Rutter blight at all; and while not of the highest quality, the Rutter is as good as the Duchess, I think. He wrote to me this fall that if I had sufficient of those pears I would have no trouble in getting ten dollars a barrel for them; and I am quite satisfied with that. Another pear which may be known to some of you is the English Jargonelle. It is an early summer pear. I have seen it in an orchard in which everything else around it was blighted—in which there were perhaps no trees five years ago—and yet that English Jargonelle stood there without a single blighted stick in it. The Duchesse d'Angouleme is not inclined to blight very much. I have found the Doyennè Boussock not inclined to blight. I have growing on my ground, surrounded at one time with Bartletts, Clapps and Flemish Beauty which have since been swept off by the blight, standing there with them untouched, three of the Chinese Sand pear. I have been growing from them some seedlings. What they may amount to I do not know, but I made up my mind there was some good stock to work on any way. I do not think the Chinese Sand pear amounts to anything as fruit, but I understood there were those who regarded them as a great cooking pear. There is a man in Pennsylvania who has originated a pear which he claims as bred from the Chinese pear and the Bartlett—the Kieffer. As soon as I heard of it the thought struck me, "He has got a good thing there," and I accordingly tried it a little, and my experience in relation to it is this:—I found last year away out in the outskirts of Kansas a man growing them who said they were blight proof. I have planted a tree of it which I procured two years ago; and this year, although the tree has been cut to pieces for buds, and handled as badly as it could be, we had eleven perfect pears on it. I have seen it fruit in the nursery. It has vigorous foliage; and, I think, a good deal of foliage. Give me a plum tree that will hold its foliage as I would like to have it, and I will give you a tree that will stand the winter as a rule. Well, now, the foliage of that tree is like the foliage of a Lombardy Poplar. I was afraid somewhat in regard to its hardiness until last winter. Last year I planted out twenty-three trees, and as I wanted the wood pretty badly at the time I cut them off about three feet high. Well, those trees wintered perfectly, and this year we cut an immense amount of buds off them, notwithstanding the severity of the weather. The productiveness is beyond all question. There has been a difference of opinion in regard to the quality, but not greater perhaps than exists with regard to the Beurre Clairgeau. I have eaten Beurre Clairgeaus that I did not consider better than raw turnip, and I have fruited them myself of superior quality. With regard to all these pears I assume that their quality is enhanced or reduced very greatly by the manner of handling them. I had fears that that pear, originating in a warmer climate, might not do equally well with us up there. I went one day to look at them, and I found five of them had been taken by somebody else, and that there were only six left. I put

them in my fruit house, and there they lay until the first of November. I then went out to look at them, and took one of them to our table at dinner, and sliced it up and passed it round; and my family liked it pretty well. Another I took to my office that evening, and cut it up and passed it around to those who thought they were judges, and asked how it was liked, and the universal testimony was, "I wish I had a barrel of them to eat." There has been a variety of opinions with regard to that pear, but where it is well ripened and well handled I have no doubt it is a pear which will meet the views of the American people generally. So far as their style is concerned it is a style that will sell them, though it is not of the highest quality.

MR. DRURY.—The remarks of the gentleman who has just spoken, I think, are very much to the point. I have no doubt he is a reliable authority in matters of this kind. For my part, I feel interested in this, because we can grow the pears in the northern country where I live, but felt a little doubtful about going into their growth on account of their liability to blight. I think there is great reason in what the gentleman has said. We see the truth of it in the animal kingdom. We know that the superior breeds of cattle, sheep, and hogs are more or less liable to diseases to which the lower breeds are not. On my own place some pear trees as far back as I can remember were killed down to the ground—every one of them. I do not know what the reason was, but I am pretty sure it was not the blight. They have all grown up again; and they are a picture of health. They are bearing a lot of little fruit which does not amount to anything; but they are hardened to all influences. I am led from this to think that it is possible that we may strike upon a hardy kind of pear that may be suitable to this country. A year ago I was in various parts of Ontario, and I saw eveywhere evidences of the blight. Just north of Simcoe, in the County of Norfolk, I saw a large orchard of pear trees—I think about five hundred, and I think mostly Bartletts and Flemish Beauties—and I said to the gentleman, "I think that is about the finest orchard I have seen. How have you escaped the blight?" He said, "I have been in the habit of painting our trees with raw linseed oil, and I attribute my escape to that." In the immediate vicinity there were evidences of the destruction of the pear tree wholesale. I have mentioned this to several gentlemen who are interested in pear growing, and they have said there is nothing in it; but if that is a preventative of blight it should be generally known. In that whole orchard there is not a single tree that had a sign of blight. I think the trees were seven or eight years of age; but there were trees in orchards all around of the same age that were blighted. He had painted with a paint brush up to the limbs. He had been doing that every year for several years.

MR. A. M. SMITH.—I heard of the same orchard this fall. I think a great many of you will remember that our friend Springer thought he had a remedy. That was, splitting the bark; but in the seventh or eighth year the blight struck them.

MR. SAUNDERS.—This linseed oil remedy has been the rounds of the horticultural journals these last two or three years. Another remedy was a mixture of sulphur and lime and carbolic acid. I have understood from people who have used both these remedies that in some instances they have succeeded, and in some they have not. I do not know whether the fault, where they have not succeeded, has been in the insufficiency of the application or not.

MR WOODWARD.—My trees are all Duchesse; and I have never yet lost one of them by the blight. They are dwarfs. I apply to them a combination of salt, phosphate, and ashes. Sometimes I add a little copperas—scattered around among the trees. I have one orchard on which I put this composition each year and manure it a little with barnyard manure; and this three or four years it has escaped blight. I think the pear blight attacks the tree from the outside, and works into it. I have also a Bartlett orchard. It is a small orchard; there are perhaps fifty trees in it; and I have not lost any Bartlett trees in a long time with the blight—never since I began to take care of them and apply this dressing every year. That orchard pays me very well. I cannot say that that remedy is a preventive entirely; but so far it has been very satisfactory.

MR. ARNOLD.—With us this blight attacks the present year's wood. How would you apply the remedy in that case?

MR. WOODWARD.—Cut it off.

MR. ARNOLD.—The Rutter has been free from blight with me for a good while, and the Goodale also. That pear is a fine grower. It is a good one to look at, and it is a fair pear to eat. I have very little faith in the different kinds of washes. The English Jargonelle is a miserable grower; when we get the pears they are not fit to eat. They are not the English Jargonelle here; they crack and go to pieces, and they rot everywhere, inside and out.

MR. SAUNDERS.—I began an orchard some ten years ago with 150 varieties; and I feel just as undecided as to what ten or twenty pears I would select if I were going to plant out an orchard again as I was at first. I coincide with what Mr. Willard has said with regard to the Reeder pear; I have never seen it blight. At the London asylum they have nine Dr. Reeder's in a row, and they are as healthy to-day as any trees you could wish to see, while all around them the other trees have nearly all disappeared on account of blight. I thought at one time the Malines was free from blight; and so it was for quite a number of years; then there came a blight which took nearly the whole of my trees. Then I thought the Clapp's Favourite was going to be free from blight. They were so for several years; but at last they nearly all went too.

MR. WOODWARD.—I do not wish to be understood as saying that the Duchesse never blights. It does blight; but with careful treatment I have avoided it.

The meeting then adjourned until ten o'clock the next day, when, upon the President calling the Convention to order, the question "Which Pears are the Most Desirable for the Amateur?" was added to that which was under consideration the previous evening, and the discussion of the two together was proceeded with.

MR. BEADLE.—I will name one pear that I think the amateur will like—I do not know anything about its value for market—the Josephine de Malines. Somehow I like that pear as the best of our winter pears. I do not know that it is the best; but I happen to know more of it, perhaps, than of some others. It is a very pleasant-flavoured pear; and when you cut it the flesh has a pretty pink tinge, which adds a little to its beauty. I suggest that that pear would be a desirable one to recommend amateurs to grow for a winter pear.

MR. HOLTON.—I think I remember last year that the President laid some of them on the table here. Can you give us any idea of how long it can be kept?

MR. DEMPSEY.—I have fruited the Josephine de Malines for several years; and I was induced to plant it in the first place from having seen specimens of it on Elwanger & Barry's grounds at Rochester. I carried some of them home and ripened them carefully, and the fruit was so delicious that I was induced to plant fifty trees of that variety. They come into bearing so very young, and the pear was so very different from what I had seen on their grounds that I top-grafted them. Since then I have been top-grafting them back. They require age; but the fruit is very fine when the tree comes to be ten years years old—with the first specimens you would be perfectly disgusted. Perhaps I I could not put it in stronger terms than to say I want no other winter pear. After it acquires a little age it is very prolific—sufficiently so, at all events. It bears a good average crop annually. The fruit is sufficiently large; the fruit is not large, but medium sized, and it ripens easily. You can throw them in a pail or in a box in the cellar, or you can mix them with a lot of turnips if you like, and every time they come out all right. They are very pretty when peeled; only they are so juicy they appear to be oily. With care they can be kept until March. If they are kept in a warm cellar they are just in their prime now. The Vicar of Winkfield is very fine this year with us; but this is the first year, I think, for as many as fifteen that I have had them to mature. It is a very fine pear when you get it in perfection; but you may only get it once in twelve or fifteen years. He who plants Vicars with a view to obtaining a dessert pear is quite certain to be disappointed, as they are very inferior when not properly grown. There are several varieties of pears that were not spoken of yesterday that are doing nicely with us. Manning's Elizabeth, I think, is one of our finest pears. Osband's Summer also; and I enjoy a good Rostiezer. These are all good summer pears. Another is Beurre Hardy. I think that of all the autumn pears we have, Beurre Hardy stands at the head of the list. It does upon my grounds. I have never seen any of the branches blighted. I do not say any pear is free from blight. I would also name besides these

Clapp's Favourite for a summer pear. With respect to Mr. Willard's theory of obtaining blight-proof pears, a few years ago they accused me of having pear on the brain. I was experimenting largely by hybridizing different varieties; and the worst of my seedlings to blight was the result of a cross between the Duchesse d'Angouleme and the Seckel. I think they are all gone. Those that appear to resist the blight best are the result of a cross of Osband's Summer with Duchesse. I have some seedlings that are very fine, but not fruited yet, which are from that cross. Therefore I fancy we have as good a chance by selecting the tenderest as by choosing the hardiest; they seem to become acclimatized. I take a good deal of pleasure in studying the theory of Van Mons, who has done more, I think, than any other man to improve the pear. He never hybridized, but supplied the seeds from the first seeds that were produced on a seedling; and he always argued they continued to improve until the third or fourth generation. After that they commenced to deteriorate. It always appeared to him that the first blossoms on a young pear tree were quite likely to be fertilized from a neighbouring tree; consequently that he actually obtained crosses until the tree had attained some age.

MR. BIGGAR.—What is your success with the Duchesse d'Angouleme?

MR. DEMPSEY.—The frost affects it; but it is a good fruit. I do not want to eat it. The Duchesse d'Angouleme matures in December. I do not fancy that coarseness that it has. I should have said something about the blight, perhaps. In our section of the country everybody was planting Flemish Beauty pears a few years ago. I had that fever myself until I got five or six hundred of them, and they went back on me. A fruit-grower there was priding himself two years ago with having the finest pear orchard in all that part of the country. I visited his grounds last summer; and it would be a little too hard to say that there was not a pear tree there then that was worth anything; but really I think that if I did so I should be telling the truth. They were all blighted. However, I attributed that to the dry weather more than to any other cause.

MR. ORR.—What is your objection to the Seckel?

MR. DEMPSEY.—If I were to speak with regard to all my favourite pears, and to include all the varieties that I liked the list would become very large. I have fruited about two hundred varieties. My aim simply is to recommend a pear that will sell in the market, and at the same time be an amateur pear. The Seckel is not profitable to produce for market purposes; but I will ask nothing better to eat than the Seckel pear in the season. The system that we have adopted for pruning standard pears is to let them do that themselves; we do not prune them at all. I fancy the less cultivation they have the better. With respect to manuring, we find nothing that will swell the fruit so rapidly as sulphate of iron—common copperas. Just dissolve it and apply it in a liquid state in the summer occasionally. Sulphate of iron and ashes are two of just about the best fertilizers I have ever found for pears. The manure should be, I fancy, applied to the surface of the soil.

MR. BIGGAR.—Some four or five years ago I sent in some pears with a young man, I coming on the cars; and when I arrived he told me the fruit dealers here said the fruit was too large. These pears were Flemish Beauties. I sold them at twenty-five cents a basket more, however, than I sold my smaller ones for. I had not many large pears until this year, when I sent three baskets of very large pears to a fruit dealer, telling the young man who took them that if she objected to them he was to take them to another party I named. Just as I expected the first person I sent them to refused to take them on account of their being so large. They were too large to sell. I find that the Flemish Beauty overbears with me. I have been in the habit of pruning back every year about one-third of the new wood. Would the pruning have any effect on the bearing, do you think.

MR. DEMPSEY.—My experience is different from yours. We often have the thermometer sink to thirty below zero in the winter. Pruning would not do with us, though it might with you; because pruning increases the wood. The Souvenir du Congres was the only variety that I missed any from last winter on account of the frost. We had shoots of about four feet growth on them; and they grew so fast that they were not prepared for the severe frost in the early part of the winter. I find that I can grow a

variety in our section by not pruning it, which will stand the severity of the weather better than one that has been pruned, from the fact that it is not so vigorous in growth.

Mr. Willard.—I question whether there is any one winter pear so valuable to the orchardman or to the amateur as the Josephine De Malines. It approximates very closely to the seedling. It is, perhaps, the most uncouth pear growing—with one exception, and that is the ————; yet it is very free from blight. With respect to the fruit not being satisfactory in its early stages, you must give the tree a little age to have it produce the fruit in perfection. The greatest success in the shape of a pear orchard that there is in the United States to-day is one the owner of which would not allow a man to put a knife to a tree in it; he says that anything that tends to disturb the circulation of the tree might tend to cause blight.

Mr. Morris.—I have noticed that pear trees planted on low, moist, rich soil are usually subject to blight, particularly if there is much vegetable matter in the soil. This induces a growth late in the season, and where that is the case you nearly always see blight the next season. I have noticed again that where trees are planted on a high knoll, particularly if it is on the edge of a ravine, you always find healthy trees. I think one of the greatest causes of blight is the long trunks of the standards. I have seen orchards in which the tops have been blighted, but which were allowed to grow from the bottom, that have afterwards remained good, healthy trees for years. I think that by proper selection of the soil pear growing might be made one of the most profitable branches of fruit growing.

Mr. Biggar.—I have not been troubled with blight except in one variety. I prune off the blighted wood as much as possible, scrape it, and give it a coat of linseed oil. Any time in the year that I find a tree is blighted I immediately take off the blighted part. My standard trees are all tall. I believe it would have been better if I had kept them close to the ground. My Clapp's Favourite is gone altogether with blight; but the blight has not prevailed to any great extent in my grounds. I use nothing but ashes for fertilizing my trees, which are healthy.

Mr. Dempsey.—We had a good deal of blight this last summer. There were only a part of the pear trees in our garden that ashes were applied to; and, strange to tell you, we had scarcely any blight in them at all; but where the ashes had given out we lost several trees from the effects of the disease.

Mr. Arnold.—We have had no blight in our section the last two years; and we have used no ashes. The thought occurred to me while I was sitting here that it was a dangerous thing to spout about new pears. I think that a man should have from ten to fifteen years' experience of a pear before he ventured to express an opinion of it. If I was to speak of any pears at all I would confine myself to the old varieties. I would even go back to the old Bloodgood that I have rejected two or three times in my lifetime. There were several old pears that were not mentioned. There is the Rousselet Stutgart, which is a splendid pear, very like the Rostiezer. The Seckel is a good pear with us if we get it on the right kind of stock, and it has arrived at an age of about twenty-five years. It is rising in my estimation. As for the Tyson, I would not be without it. I think it is equal to the Seckel in flavour; and it is three times the size. We have not heard the old Belle Lucrative mentioned. I always think that is hard to beat. It grows to a good size with us. It is not equal to the Bartlett, of course, in that respect. It is very variable in appearance. You might pick three or four different kinds of pears, you might say, off the same tree. The Duchesse as grown on a quince stock and as grown on a pear stock are altogether different pears. I never saw a Duchesse worth looking at grown on a pear stock. It is not half the size with us grown on the pear stock that it is grown on the quince stock. The Winter Nelis is a very ugly looking pear, but an excellent one. The Vicar of Winkfield I would not have in my ground if I could grow the Glout Morceau; but I cannot grow it on my place. Mr. Saunders grows it. There is no profit in winter pears; because you cannot rely on them. You may pick winter pears all at the same time, and pack them all away in the same place, and yet you will find that while some of them will turn out excellent, others will not be fit to eat.

Mr. Saunders.—The Glout Morceau is one of my favourite pears; and for some

reason or other it appears to be less liable to blight on my grounds than any other variety I grow. The fruit is very good. It grows to be a good fair size with us, and ripens uniformly—that is, the pears will nearly all ripen about the same time. The Glout Morceau is a pear I would not like to be without; and yet it is a pear I would not like to recommend other people to grow, because generally it is a failure. The Tyson is one of my favourite pears also; and I find it produces more fruit to a tree on an average than any other pear I grow. Still, it is not a large pear. It is a very delicious pear; and it comes in at a season when pears are very acceptable.

Mr. Holton.—It has always been the impression that the Duchesse grown as a standard was a failure. My experience with it is very different. To me the flavour of it grown on the pear is equal to what it is grown on the quince. I have grown it several years in this neighbourhood on sandy loam, and fruited it; and it is a fine cropper, the fruit is always fair, and it brings you a good price. There are a couple of summer pears that have done well with me. One is the Beurre de Koning, and the other is the Suprême de Quimper. It has proved a strong tree, and it is doing well. The pear is a little larger than the Seckel, and is a good colour.

Mr. Saunders.—Another pear that we find very successful about London is Elliot's Early. It produces a good crop of pears large in size; and they have a blush of red on the cheek sometimes. It is a pear there seems to be money in, coming in, as it does, early—so early in the season that there is nothing else to compete with it but the Windsor Belle, which tastes like a mixture of sawdust and vinegar. The Beurre de Koning with me is too shy a bearer to induce me to plant it to any extent. It does not seem to thrive in our cold climate. With me it is a poor bearer.

Mr. Arnold.—I would like to ask Mr. Holton if all his Duchesse, grown on standards, have produced equally good pears. If he has a quantity of them that have been grafted promiscuously on pears, it is a pretty good proof that the Duchesse can be successfully produced in some districts on standards.

Mr. Holton.—I have about half a dozen trees of them. They are now fifteen or twenty feet high perhaps. They are uniformly good.

Mr. Arnold.—No one would own my Duchesse on a pear stock.

Mr. Willard.—Probably there is no one variety that is growing in demand so highly in Massachusetts—which is probably the greatest pear-growing State—as the Duchesse as a standard. During the last ten years the demand for that variety, as a standard, has increased, I presume, fifty per cent.

Mr. Gott.—There is a prejudice against dwarf pears in this country. They will have them standards or nothing at all.

Mr. Wellington.—That must be owing to the different part of the country you live in; because our experience is that you can hardly keep up with the demand for dwarfs at present.

Mr. Dempsey.—In a section of country where there is not much snow, it is exceedingly risky to graft pears on the quince.

Mr. Arnold.—We work our dwarf trees right down to the ground. Some years ago a gentleman applied to me for some Dwarf Seckels. I said to myself, "the man does not know what he is talking about; a Dwarf Seckel is perfectly worthless grown on the quince stock." I ventured to offer him some on a pear stock; and that gave him a tolerable Seckel.

Mr. Morris.—My experience of the Seckel on the dwarf is that it makes a perfect union. A great many of the failures in the dwarf pears come from budding on too small a stock. I have seen them myself budded on a quince not much larger than a lead pencil. The result is that you have a tree with a very large shoulder, and that often breaks off.

Mr. Saunders.—My best Seckel pear is on the quince stock.

Mr. Beadle.—I have about as beautiful trees of Seckel on the quince stock as I have ever seen, and I get finer specimens of fruit from it than I can off the pear stock.

RASPBERRIES.

The Association then took into consideration the two following questions, viz.: "Which are the most profitable varieties of raspberry for market?" "Which are the most desirable for amateurs?"

MR. A. M. SMITH.—Which are the most profitable varieties depends, in a great measure, on how near you are to market. There are very few varieties of raspberries that would stand shipping a long distance. I have found fully as much profit in the Highland Hardy as in any raspberry I ever grew, for this reason—that it is the earliest. You do not get such an amount of fruit; but you get it so much earlier that it will command a much higher price. Perhaps if all of us went to cultivating it, it would soon become depreciated in value. We got for our Highland Hardy this year about double—yes, quite double—what we did for our Philadelphia; and the crop was probably about two-thirds as large. For a near market, I consider the Clarke a profitable raspberry. It is large-sized, and has a fine colour and flavour, and it will always command a very high price. But it is too soft to ship. And the same might be said of the Herstine—with this exception, that it is a little tenderer variety. It does not succeed in all localities as well as the Clarke. I do not doubt but that the Philadelphia for the million is the best raspberry that has been tested yet. It is as hardy, probably, as any of the less prolific; but its colour is against it. It does not bring such a high price in the market as berries of a better colour. I am inclined to think that the Cuthbert is the coming red raspberry for the market. I have only fruited it this season for the first, and that only on a small scale. It is a large berry; very fine colour, and moderately firm, and I should think would command a good price. For amateur culture I do not know of anything much better than the Herstine and the Clarke, in red raspberries. Where the Herstine will succeed, it is a very fine berry. I would not recommend it, though, outside of the peach-growing line. It is inclined to winter-kill. I have a seedling of my own that I call the Niagara, which I consider valuable as a late berry. It is larger than the Philadelphia; firmer, and of better quality, though perhaps not quite as good a bearer; and it is about a week later. Of the Blackcaps, I have generally found most profit in the Davison's Thornless and the Mammoth Cluster. I think the Gregg is, perhaps, going to supercede these for profit, though I have only fruited that one season.

MR. GOTT.—For largeness, and beauty of fruit, Naomi and Turner stand very high. Both those varieties are very profitable. The canes are hardy; grow very high and thrifty; and the fruit is abundant and well-proportioned. The Clarke is also a very profitable fruit; very highly flavoured, fine size. The cane is hardy and very thrifty. The Philadelphia is well known. It is considered a profitable fruit. The Highland Hardy and Brandywine are near relatives in appearance and quality. Neither of them is considered profitable. The only merit in them is that they are early. The Cuthbert is promising. With us it is the coming raspberry. The cane is very thrifty. It is an abundant bearer; quite hardy; and the fruit is very large, handsome in form, and of fine quality. Mr. Saunders' No. 55 has been tried. It is something like the old American Ganargua; and it has been said that it will have good quality. We have not sufficiently tested it yet. Among the Blackcaps we would name as first, in point of profit, the Mammoth Cluster. The Gregg is likely to supercede it, however. The Gregg has all the good qualities of the Mammoth Cluster—with the additional merit of being a little larger—having a little more bloom, and coming a little later in the season. Davison's Thornless is not profitable. Seneca is profitable. It is a most robust-growing bush; it is almost impossible to kill it by cold or other means; and it is sure to produce a crop. The Ohio is a great producer; but if it is allowed to produce a very heavy crop in the former part of the year, the crop in the latter part of the year will be very much weaker.

MR. A. M. SMITH.—I neglected to mention Mr. Saunders' hybrid. For an amateur berry, I know of nothing better; but its colour is against it as a market fruit. It is generally admitted, I believe, that where the Franconia will bear, it is a very fine berry. I have found it too tender.

MR. WELLINGTON.—Until the last few years the Franconia has been the berry, as

regards price and colour; but the cold weather has destroyed it. My opinion is that the Cuthbert is going to be the raspberry. It is of good size and colour, has a good shape, and is very productive. It seems to have the peculiarity of dragging its crop along for a greater length of time than most other varieties. The Turner I believe to be a good berry; and in conversation with Mr. Hooker, of Rochester, one of the largest fruit-growers on the other side, he says that the Turner is with him one of the largest raspberries he has. The Philadelphia is, I think, going to be done away with. It is not a berry that takes well in the market. The colour is against it, with the dealers in Toronto; they want something of a lighter colour and better size. The Herstine is a good berry; and my experience is that it can be grown outside the peach-growing district. But it is not a shipper. The Gregg I believe to be the best of the Blackcaps; but I do not think it will supercede the Mammoth Cluster, because it is a little later. There is one berry that I think the amateur should cultivate any way, and that is a yellow berry, the Caroline. As far as tested it has proven hardy, a very good cropper, and a berry of good quality.

Mr. Willard.—I have been interested a little in the Cuthbert; and I had reports from Kansas last spring that the Cuthbert had stood the severities of last winter better than almost any other berry there. I have raised a great many berries for the Philadelphia market; and I have found the Highland Hardy one of the best for profit that I have raised, simply because it comes in very early. It has invariably brought me twenty cents a quart in Philadelphia. I have no doubt the Cuthbert will prove itself worthy of all that has been said about it this morning.

Mr. Beadle.—What does Mr. Willard know about the Caroline?

Mr. Willard.—I do not know anything about it, any more than I have looked into the matter a little with a view of planting it, and I do not want it. Our people want a bright attractive berry, and one that is hard enough to bear handling. Therefore the Caroline would not suit my purposes.

Mr. Wellington.—I have tested the Caroline, and I call it very good; but it is merely a berry for the amateur on account of its colour.

Mr. Beadle.—I was very much disappointed last summer in the Caroline that was grown on Mr. A. M. Smith's grounds—I have not fruited it yet. I was down at his place and saw the fruit there, and he kindly, afterwards, when it was more perfectly ripe, sent me a basket of it; and I was very much disappointed in the quality. It was almost flavourless. It had a pretty colour, somewhat resembling Brinkle's Orange, but a long way off from it in flavour.

Mr. A. M. Smith.—I would simply say, in regard to the Caroline, that it has something of the Blackcap habit of growth. The first season it droops over and lies on the ground. The plants fruited on my place when they were only one year out; and the berries were picked from near the ground, where the bushes were lying down, and quite shaded by the very strong growth of the new shoots, which might account in some degree for the insipid flavour. It is apparantly a very hardy berry, and it has this peculiarity: it propagates both from suckers and the tips. There has been a want felt among amateurs for a good, light-coloured raspberry—something of the nature of Brinkle's Orange—that was hardy enough to stand this climate; and I was in hopes we were to get it in the Caroline; but, if its flavour is no better than it was on my place this year, I cannot speak very highly of it. In regard to the Turner, I consider it would be a very valuable raspberry for the colder parts of our country—in sections where the Clarke, Herstine, and some of our finer varieties will not succeed. The Turner, I am told, will succeed almost anywhere. The only objection I have to it is its profuse suckering. In regard to the Brandywine, it is claimed that it is an excellent berry for shipping. I presume it would be; but there is that same objection to it with regard to suckering; and it is also small. Mr. Gott mentioned that it came about the same time as the Highland Hardy. My Brandywine is a good deal later.

Mr. Dempsey.—I think raspberries a very profitable crop. I think they rather surpass the strawberry in point of profit. I adopt the same principle in recommending varieties of the raspberry to the people that I have recently done with regard to apples. I say to them, "Go to your neighbour; ascertain what variety of apple is succeeding; pick

a specimen of that apple and send it to the nurseryman you wish to patronize, and say, 'Send me so many trees that will produce apples just like that; if they do not, I will prosecute you.'" Otherwise, I find that the nurserymen sometimes do not send the same varieties that I recommend, but I have to be responsible for it. I have a neighbour that would not plant anything else in raspberries than Davison's Thornless and the Blackcaps. Well, I failed to succeed with Davison's Thornless. The Seneca I find a very profitable berry, except in regard to one thing, that is it matures so irregularly. It commences to ripen middling early. It is not an early berry, however. We do not get enough berries at a time. In this respect, I would prefer the Mammoth Cluster to any other berry that we cultivate, from the fact that our pickers can clear the vines in about three pickings, and it is very fine fruit. I do not think the Gregg will ever supercede it, from the fact that we want them both; the one succeeds the other. I have every confidence in the Gregg. With respect to some of the red varieties, the Philadelphia is wonderfully productive and hardy; but when you have said that, I think you have said all for it, there are so many varieties that are superior to it in point of flavour, colour, and shipping qualities. I like the Herstine better than the Clarke on my grounds. I find it sufficiently hardy. I have never seen an inch of it frozen in my life. The Turner, I think, is going to be very profitable. It is a little in advance of the Philadelphia—not quite so productive; but it is a larger berry and a little better berry, and I fancy it will stand shipping better. It is inclined to sucker a little more than the Philadelphia; but the cultivator can easily overcome that. The Cuthbert I am perfectly well satisfied with. I fancy that we shall never get too many of them; because they ship very nicely.

Mr. Woodward.—I am not a raspberry grower now, except for family use. The most successful plantation of red raspberries about Lockport—the one that has been established the longest, and the one that has made more money for the grower than has been made out of any and all other varieties—is of the Franconia. It has stood every winter we have had perfectly; and it bears abundantly, and brings the highest price. A gentleman there, who has been dabbling in the newer varieties, told me that he would rather have the Franconia than all of them. I should want, in Blackcaps, the Doolittle for an early berry. It is a good, productive berry, and the earliest of the good ones that I know of, except the new one, the Souhegan, which, I am told, has some merits. And then there is the Mammoth Cluster. I would grow those three if I were growing for market and for drying.

Mr. Beall.—Brinkle's Orange is reported everywhere as being very tender, and the Philadelphia as being very hardy. I grow both of these, side by side, and one is equally as hardy as the other, in my ground.

Mr. Dempsey.—Brinkle's Orange stands with us.

Mr. Beall.—The same number of plants with us will produce more quarts than the Philadelphia; I think fifty per cent. more.

Mr. Dempsey.—One quart of red raspberries with us will fetch more than two quarts of yellow ones.

Mr. Arnold.—I do not know whether we have a better raspberry yet than the Franconia. The Highland Hardy I rejected years ago. It sometimes seems to me that it is like that great strawberry, the Mexican or Maximilian, it has to change its name every few years to keep in existence. The Highland Hardy has been called by different names. It is early, and stands the winter well; but it is so remarkably small with me. If we want size, and if it will stand the winter, let us go back to the old Hornet. Who ever had a larger or better berry than that? The Belle de Fontenay, if we can get rid of the suckers in it, where can we get a better bearer? It bears splendid crops. I thought I was having good success with berries; but a neighbour took me to the north of his house and showed me some Yellow Antwerps that made me ashamed of mine. There is too much wood in the Blackcaps to suit me. There is less in Mr. Saunders', because they are a cross between the two varieties.

The following paper by Dr. Warder was here read by the Secretary :—

THE CLIMATIC INFLUENCE OF TREES.

BY JNO. A. WARDER, M.D., NORTH BEND, HAMILTON CO., OHIO.

Mr. President and Gentlemen of the Ontario Fruit Growers' Association :

After hearing the paper on "Protection to the Orchard" read at the recent Pomological Meeting in Boston, Massachusetts (September 15th, 1881), you, Mr. President, conferred upon its reader the honour of an invitation to prepare a lecture for presentation at the approaching meeting of your Society at Hamilton, Ontario.

The proposition was accepted with hesitation—partly on account of impaired health, but mainly because of an apprehension that yourself and your worthy *confrères*, as fruit-growers, would be disappointed in the character of the topic selected—"The Climatic Influence of Trees." However, after traversing a portion of your beautiful and productive Province in the lovely days of October, and after beholding the wonderful progress that has been made by your citizens in clearing off the dense forests that once clothed your fertile soil; while observing and considering the changes consequent upon converting the woodland into the farms, the forest into the prairie—the conviction became stronger that the theme must be drawn from that group of topics, which deserve so large a share of the thoughts and consideration of the American farmers and statesmen.

A perusal of such numbers of your valuable transactions as have been kindly furnished by the secretaries of the two leading societies of the Dominion, also assure the writer that such a theme as the one about to be presented may be welcomed by you, and he feels encouraged by finding that, on your side as well as on ours, forestry is becoming an important question, and that, to some of you as well as to some of us, *the sprite will not down*—the question must be met: the sooner the better! Nor should the great interests involved in the word be ignored, either by agriculturalists or statesmen. It is high time that our attention should be directed to a consideration of the subject in its bearings upon the agriculture of our continent and its future maintenance and prosperity.

The transactions of the Ontario and Montreal Societies already contain evidence of your interest in forestry, as shown in the valuable papers relating to Canadian forests by Mr. A. T. Drummond, Mr. Jas. Little, Mr. H. G. Joly, Mr. G. M. Dawson, Messrs. McAinsh, G. Peacock, and others, which may be read with profit, and which show that your attention has already been directed into this channel, all of which encourages me to continue. At the same time, the intelligence and the familiarity with the subject thus displayed by your own members, might well cause a stranger to feel some diffidence and hesitation on entering an arena with which you are supposed to be so much more familiar than a casual visitor. It is, however, but a limited portion of the subject which it is proposed to discuss at this time, Mr. President, and as you are aware, the task is undertaken only after having consulted you, and having received your approval of the discussion of "Wind-Breaks, and Shelter Belts, and Sheltering Groves for Ontario."

Reference has already been made to the extensive clearings that have been effected by the generation of men now occupying the interlacustrine region of fertile lands in Upper Canada. It seems almost incredible that in half a century or less, so vast a change should have been effected in the condition of this broad plateau, as is evident even from the car windows of the rolling train. Over wide areas the forests that once encumbered them have disappeared, leaving no traces of their former existence in the smooth and wide savannas of smiling fields, covered with bountiful crops and beautiful herds. In a brief period the howling wilderness of woods and swamps, which greeted, and might well have repelled, the sturdy settlers, has been transformed by man's persevering industry into the smiling prairie. Wonderful transformation!

The very stumps of the sylvan monarchs have been rooted out; the soil has been tamed of its wildness and brought into the highest culture over wide tracts; and, with the evidence of high farming that so generally prevails, there have come also the improved

animals to consume their share of the products, and to aid in maintaining, or even in enhancing, the natural fertility of the soil.

One of the most striking features of the country traversed, next to the apparent fertility of the land, was the broad extent of the tillage, where large fields made parts of great farms, and these were bounded on all sides by other farms of apparently equal dimensions lying contiguous to them on every side, or with small intervening wood-lots that could rarely be called forest lands, for their limited extent, and their rifled condition, would hardly entitle these bits of woodland to be called forests—they are but shadows of their former selves.

Looking out from the car-windows, on either hand one might behold vistas opened over these fields that extended in many cases for miles without the interruption of a grove or a tree, or even a stump or a bush!

Here, then, while finding so much to admire in the results of the industry of the settlers, who, in half a century or less, had effected so great a change upon the earth's surface—here a theme was suggested to the traveller for him to present to-day to his friends of Ontario. This is what he now desires to impress and to emphasize—*The necessity* for you to protect yourselves, your cattle, and your crops from the storms of winter. He begs you to begin at once your efforts to modify and to meliorate your climate by restoring barriers against the winds which you have invited by too widely opening to them doors of access to your homes. He also begs you, at the same time, while beautifying your country, to provide against the future necessities of the people by producing in these plantations future supplies of fuel and lumber. Yes! even here, and on these fertile lands, this may be done, and by the wisest economy, by planting trees in protective groves, but especially in wind-breaks and shelter-belts on all your farms.

While occupying even a considerable portion of arable land, that would thus be withdrawn from the dominion of the plow, these plantations will, nevertheless, inure to the advantage of the farmer and of the country by enhancing the fertility and productiveness of the remainder of the land thus sheltered, as has been demonstrated on the open prairies of Iowa wherever these shelters have been applied.

The whole of the route traversed by the Grand Trunk Railway westward from Kingston, is very happily situated in respect to lacustrine influence which must greatly modify the climate of the region. The broad surfaces of those great inland seas, Ontario, Erie, and Huron, cannot fail to exert the well known effects of large bodies of water upon the atmosphere. It is, however, the region west of Toronto that is most happily situated in this respect, and here, too, the prevailing character of the soil seems to adapt the region to high farming. Here the lacustrine surroundings are most fully developed; and here, while enjoying the advantages derived from this source, the inhabitants must beware how they expose the country to the disadvantages that may arise from a too open exposure to the water. The winds must not be allowed too free an access to the land.

To obviate the effects of the winds it is advised to plant groves about the farmsteadings to the windward sides of barns and sheds as well as of the dwellings. These should by all means be supplemented by evergreen shelter-hedges and screens about the residence and out-houses. The fields and pastures should be protected by wind-breaks on every farm.

The wind-break demands a liberal space and the planting of numerous trees to make it effective. In a champaign country these shelters should not be more than forty rods apart, nor should they occupy less than four rods in width, though even a single or a double row of trees between two fields will furnish a great deal of shelter, especially if they be evergreen species.

The soil should be well prepared by thorough ploughing and harrowing, so as to produce a good tilth. To plant, parallel furrows should be drawn four feet apart, in which to set the little trees. This close planting is particularly recommended where the use of deciduous trees has been determined upon, but more space may be allowed for the evergreens, and where these are planted in single or double rows, with the trees of one row set opposite to the interspaces of the other, six or eight feet may be allowed. If the evergreens have been planted three or four feet apart at the first, alternate trees can be removed and set elsewhere when their limbs meet on either side. They will be saleable

to your neighbours, or they may be used in the extension of your own shelters; at any rate they will have already served a good purpose by rendering the screen more effective —they have paid their way.

The planting, particularly of evergreens, should be done in the spring, and care should be taken to preserve the roots from exposure to the sun and wind. If these delicate organs be once desiccated they never recover.

Planting small trees is a very simple operation, and may be thus performed on land prepared as already directed: a spit of the mellow soil of the furrow is lifted with a spade, the little tree is placed, its roots are spread out and the earth from the spade is thrown upon them—this needs to be well pressed by the foot, so as to bring it in close contact with the fibrous roots and exclude the air as thoroughly as possible—sufficient mellow soil is then thrown about the tree, so that it shall be buried rather deeper than it had been previously. Two men with spades and a boy with trees may constitute a team for this work, and carry two rows. A favourite plan in Iowa is to employ the small force in a single furrow that has been freshly deepened by the plow. One man follows the boy, setting the trees with his hands and tramping with his feet, so as to make them stand to the line, while a second follows with a hoe or shovel and draws in the earth. A cultivator or double-shovel plough is then passed along each side of the row.

The plantation should be well cultivated and kept clean for a few years, longer or shorter, according to the thriftiness of the species, but until the trees shade the ground, when they will take care of themselves. Cattle must be rigidly excluded.

Various combinations of species have been recommended for these belts, but, as a rule, in forestry, it should be borne in mind that evergreens and deciduous trees do not succeed so well when mixed as when each class is massed separately. To this there may be some apparent exceptions—the European Larch, and the Scotch Pines, or Norway Spruces are often found in the same group doing well together—so in nature we sometimes find similiar admixtures; but all the evergreens would be likely to suffer if they were mingled in a plantation with the rapid growing and umbrageous elms, cottonwoods, maples, and other broad-leafed trees. Beautiful and effective for shelter as are the evergreen conifers, however, these native deciduous species cannot be ignored, nor should they be neglected nor dispensed with by the farmers who may desire as quickly and as cheaply as possible to produce an effect in the shelter-belts. Let such an one begin with the poplars, willows, or with any other trees and cuttings that are at hand, always excepting the so-called Lombardy Poplar, which as an ornamental (?) shade (?) tree already shows its aspiring head in some of the western towns of the Dominion.

Indeed, both classes of trees may be happily combined without mingling them promiscuously; they may be planted in the same belt but in separate rows, putting the sturdy native deciduous kinds in a few rows on the outside, using the cottonwoods, white willows, etc., which grow freely from cuttings, and which rapidly produce an effective screen; next to these may come the elms, the oaks, maples, or white ash, and other kinds. These thickly set will soon rise and form a protection to the evergreens.

Mr. H. G. Joly, in the sixth report of the Montreal Society (for 1888), speaks in high praise of his cottonwoods, which, in twenty-three years, had attained the height of sixty feet with a diameter of twenty-five inches. This is a remarkable growth truly, and though the timber be not of superior value, the desired shelter is very quickly produced, and, as he wisely suggests, it will aid in protecting other trees. One form of the cottonwood is a great favourite in Scotland, where it is called the Black Italian Poplar, and perhaps the same kind is planted extensively in parts of France, where it is known as the Peuplier du Canada.

The European white willow (*Salix alba*) is another tree of similar characters—easily multiplied by cuttings, of rapid growth, and largely employed in prairie regions for wind breaks and shelters. When matured these soft-woods will be found to have great value for many purposes, though inferior to hard woods and resinous trees either for lumber or for fuel. The charcoal used in the manufacture of gunpowder is almost exclusively prepared from the white willow.

But your own native trees claim your consideration, and, as appears from your transactions, they have received deserved attention in your discussions. The noble American

oak ("Canadian!") (*Quercus alba*) merits the care of all planters, especially in the groves. Though it be rather slow in its early growth, it may be supported by rapidly growing species that must be gradually removed as the oaks need the space they have occupied. Oaks, or their acorns, may be planted among the poplars and willows of the outside rows, and they will be ready to spring into a vigorous growth when these pioneers are removed.

The sugar maples will make lovely groves that will yield their sweet tribute, as well as lend their beauty to the landscape while living, and furnish valuable timber or fuel when cut down. The invaluable white ash should be much more largely planted in groves and by the roadside, as it makes a beautiful and most useful tree. The American elm, too, has its uses as timber, and is especially adapted for avenues, where room is given for the development of its wide-spreading and wind-resisting branches. The wild cherry—the back, not the red—(*Prunus serotina*) is commended for its elegance, its thriftiness, and rapid growth, as well as for the great beauty and usefulness of its lumber, which is quickly produced.

In your discussions on the subject of shelter, as reported in one of your volumes, a native tree is named, which is well to have recognised for its beauty as well as for the merit you very properly attribute to it as a bee-pasture. The America linden or bass-wood (*Tilia Americana*) may very well be made a leading component of the home groves. Its rapid growth will soon make it effective, and its sweets will certainly be welcomed by the bees. The timber of the linden, too, has its uses, though very soft and inferior to many other species, and its inner bark has a commercial value as the material of bast matting, while the wood is used for paper pulps.

There are many other trees with which you can experiment in your planting, but they need not now be mentioned.

In the selection of evergreens for these shelter-groves and belts, the hardy natives of your own country should first claim your attention. Nothing can better serve your purpose than the common white pine (*Pinus strobus*), and the red pine (*Pinus resinosa*). Both are rapid growers when fairly started, and both are well adapted to your soil and climate. For a shelter-grove or wind-break they connot be surpassed. Next to these, and in the same genus, come the foreign kinds, known as the Scotch (*Pinus sylvestris*), and the Austrian (*Pinus Austriaca*), which are rugged and thrifty; of great value, both growing and when felled; but not equal to our natives above-named, either for their future lumber nor in the rapidity of their growth. Neither of these can compare with our natives as ornamental trees, though they are often planted with that end in view. They belong to the forest rather than to the lawn, for which we have lovelier species.

Of spruces, you have the natives, the beautiful white spruce (*Picea alba*), and the black, which often has a blue tint (*Picea nigra*), and the variety often called red spruce —trees of medium size and beautiful, but excelled in size and utility, whether standing or felled, by the foreign exotic Norway spruce (*Picea excelsa*), which yourselves have decided, and very correctly, to be the very best of all evergreen trees for the shelter-belt, on account of its hardiness, its adaptability to all soils, its rapid growth, dense spray and foliage, and its comparative cheapness. The Norway is also a very pliable tree, and bears transplanting remarkably well; and in the shelter-hedge it patiently submits to the free use of the knife in close trimming. For the shelter-grove, and especially for the single or grouped trees of the lawn, nothing can excel the beautiful grace of form, nor the depth and purity of green presented by the common American hemlock spruce (*Tsuga Canadensis*). This species was common in much of your early forests, and must be familiar to you all. The hemlock has a northerly limit, as shown by Mr. Drummond's map, extending from the north-west and north-east coasts of Lake Superior, by the head waters of the Ottawa River, crossing the St. Lawrence below Quebec, and traversing New Brunswick to the ocean in latitude 47 degrees.

The hemlock makes such a dense growth of foliage and of slender twigs that it is perhaps the very best plant for the protective shelter-hedges that should be found about the dwellings and out-houses of every farm in your broad domain of Ontario.

The native balsam (*Abies balsamea*), as you seem to be aware, is hardy enough and very beautiful when young, but unsatisfactory for planting, because it is apt to grow shabby when older.

The red cedar (*Juniperus virginiana*) has a wide range, both north and south, east and west; though less extended than the other native evergreens, this juniper is found in your part of Ontario, and would be hardy enough, which is not the case with the Irish juniper and some other garden forms.

The red cedar has been called the poor man's evergreen in our western states, because of its abundance, its consequent cheapness, and the ease with which it may be brought into cultivation. Its growth is sufficiently rapid. Trees set out twenty feet apart have formed a close wall of sheltering green, while their tops have grown twenty feet high, with branches from the ground, and all within twenty-five years from the seed. This tree needs age to make its lumber valuable; while young there is too large a proportion of alburnum or sap-wood. When the red heart-wood is developed the timber is perdurable, and highly valued for posts, sills, and other uses where durability is required.

One of your most beautiful and most abundant native evergreens is yet to be mentioned—the American arbor-vitæ (*Thuya occidentalis*). This is erroreously called white cedar, which is quite a different tree (*Cupressus thyoides*), also found in parts of the Province, and reported in Mr. Dawson's catalogue, on the faith of Mr. Brown, on the great lakes.

The arbor-vitæ abounds everywhere on low lands, and Mr. Drummond reports it on his map as reaching to James Bay, in latitude 52° north. This plant is very abundant along the line of the Grand Trunk Railway, and in favourable situations immense numbers of young plants might be obtained from the mucky lowlands, but it may also be procured from the nurserymen, of any desired size and at low prices, in much better condition for planting out than those taken from the swamps.

The arbor-vitæ and the hemlock spruce, though admirably adapted for the construction of wind-breaks, are also the two very best species for planting as shelter-hedges upon the lawn around the gardens, and about the dwelling, and out-houses, wherever it is possible to introduce these screens. You are strongly urged to set them abundantly in all such places for the comfort they will afford to your families.

Plant hemlocks and white spruces on the lawn near your houses. The shelter-groves, to which allusion has already been made, should not be overlooked nor forgotten. These should be placed rather near to, and on the windward sides of your buildings. Select the site and prepare the soil thoroughly before planting out the trees you may have selected; set them closely to produce an immediate effect. Three rows in every four may be of inferior or cheap kinds, to act as nurses to the more desirable plants that are to remain permanently; the former must be removed as soon as these last need the space for their healthy development. Of course the whole lot should be well cultivated for a year, or until the ground is well shaded. Exclude all cattle from the grove—this is absolute!

Finally, my friends, lest you become aweary with too long an article, let us draw this to a conclusion, though you may rest assured the half has not been told had the discussion been intended to embrace all the trees that are worthy of your care in general planting. A few only have been introduced that were supposed to be especially adapted for the object in view—that of providing shelter-groves and wind-breaks in the open country to compensate, in some degree, for the excessive removal of the natural forests, which has already occurred in portions of your country, just as it has happened in our own States. In your north-western Provinces there are open prairies which must be planted, and doubtless will be, by hardy settlers, who will imitate the examples set them by our fellow-citizens on the broad trans-Mississippi plains. But it is especially you, my good people of the Province of Ontario, and you, dwellers in this fertile, interlacustrine plateau, who are now most earnestly entreated to begin at once the work of providing the needed shelter for yourselves, your cattle, and your crops, by planting homestead groves, shelter-hedges, wind-breaks, and shelter-belts. Do it, my friends, also, for the sake of your friend and well-wisher from over the border.

Mr. Saunders.—I desire to move a vote of thanks to our esteemed friend, Dr. Warder, for this very valuable contribution on the subject of forestry. The matter is

becoming yearly of more importance to us all. He is so well known all over the continent as an authority on the subject that not a word more need be said. I would add to the motion, "and that the paper be referred to the Executive Committee for publication."

MR. ARNOLD seconded the motion, and in doing so remarked that if the recommendations of the Doctor were acted upon he would receive the thanks of the next generation.

The motion was carried.

MR. DEMPSEY.—I have been a few years acquainted with Dr. Warder—have had the pleasure of meeting him a few times on occasions something like this; and I do not know—to use what may seem rather extravagant language—how any person who knew him could fail to fall in love with him. He is open-hearted; he is a man filled with information—on pomology especially; and he is willing, under all circumstances, to impart his knowledge for the benefit of others.

MR. GOTT here read the following paper:—

FRUIT ON THE TABLE.

"Quite a good many farmers have come to feel that they were not doing their family justice without placing upon their tables a bountiful dish of fruits such as the various seasons of the year afford, beginning with strawberries, and following into cherries, currants, raspberries, blackberries, grapes, apples, peaches, plums, and pears. Farmers of this class are not so numerous as they should be, nor as they will be, in our opinion, ten or twenty years hence."—*American Rural Home, June 10, 1882.*

"While there has been a marked improvement at the table of many of our farmers within the last few years there is yet much to learn. One of the greatest faults in this direction, and one which is the cause of very much illness, is the comparatively small quantity of fruit they use. It is a mistake to consider that fruit, like confectionary, is to be taken only between meals, and not to be counted in the work of sustaining life."—*London Farmer's Advocate, June, 1882.*

Such are some of the profounder utterances of the late agricultural press upon the subject of fruit as food upon the table of our country peasantry and more wealthy farmers. It is unquestionably a subject of great importance and influence in the economy and hygiene of our people. Fruit on the table in this connection is not merely a question of fruit for show or exhibition purposes, but rather is it to be understood that fruit is to be supplied our dining-halls and refreshment tables, not merely to beautify and decorate, or to please our fancy, but more substantially for food, for the full and perfect gratification of an inbred appetite and taste, for the sustenance and support of our exhausted physical forces, for medication and health, for the furthering and promoting of pure animal enjoyment and pleasures, as well as to defend us against the many dangerous and obnoxious influences to which flesh is heir. Fruit in this connection is one of those many merciful provisions of nature designed for the highest and purest enjoyments of the needy creature, man, one of those safeguards that the Creator of all has thrown around the frail human life, and one of those fertile sources of many high and noble physical pleasures. Fruit is further a fine example of the strict economies of the Designing Author of nature in His infinitely wise and merciful provisions for the furtherance and accomplishment of the supreme uses of the plant itself in its future life and continuance in being, and also in furnishing food and pleasure to the many depending sensitive creatures who daily wait upon it. In its very nature it is health-giving and pleasurable. Fruit is, in short, condensed sunshine, and just what is needed for the best uses of refined and refining as well as vulgar animalism. It is mainly composed of diluted sugars and acids, in delightful admixture held together by fine vegetable tissue, and in this diluted form is found not only to be pleasureable, but essentially necessary for the well being of the animal economy. It will be well for us to understand here that, whenever fruit is mentioned in this connection, matured and well ripened fruit must be understood. Fruit in that beautiful

tempting condition, when the internal acids are largely changed to sugars, and the whole mass of that inviting toothsome colour that engages at once the sense of sight, and is of that yielding state of softness to the sense of touch that gives assurance to the eater.

This is the condition when the forces of nature have consummated her elaborate work upon and in it so well understood by the well trained fruit-grower, and when it is alone fit for refined and refining human food. The influence of such food upon the human constitution is doubtless very great, and definitely marked. This, to us is the ambrosia and nectar that was formerly thought becoming for the dieties only to use as food, and never for ordinary mortals. The keen observer of human nature can almost readily discern at a glance the difference between the man who is in the habitual use of fruits and vegetables largely in his diet, and the man who has a large dose only of animal ingredients in his constitution. In the first case the food being select, congenial and mild, the nature manifests the benign influence of such congeniality. How different is this beautiful influence to that of the mere animal or flesh eater. By this we would not be understood to discard *in toto* all animal diet, on the contrary, we practice and most devoutly believe in a mixed diet as best and most suitable to the urgent necessities of our present economy. What we do mean is simply this, that we most firmly believe, that we, as a people, use too much of pure animal diet, and if the relishable qualities of fruit more and more entered into our daily diet, it would, in our humble opinion be better for us intellectually, physically and morally. We hold fruit in its uses to be a medicant, a corrective, a solvent; in this connection, as well also, we hold it to be a food, a tissue builder and a force producer in the human organism. Further, we believe, and would teach the use of fruit at all seasons and at all times. We believe in fresh fruit, in canned fruit, in evaporated fruit, and in preserved fruit, in jellies, in marmalades, in beverages, in cider, and in wine. We believe in its use further in the autumn and in the spring, in the summer and in the winter, and on all days and occasions in company and out of company. In short, we finally believe in the wisdom of its use thoroughly, wholly and completely. We believe, furthermore, in all fruits that are by our experience known to be good for food and pleasant to the eye, and to be desired to make us better. In this connection, we believe in strawberries of all sorts, although connoisseurs would fain have us believe that some varieties are better than others. But to us they are all good and equally to be taken with equal amounts of rich and well prepared fixings. We believe also in raspberries and blackberries, and can take them in equal doses, being also as with strawberries well-fixed. As for the kinds or colours, we have very little discerning choice so long as the true and genuine raspberry qualities are present and well developed. With our present facilities for preserving and canning these fine summer fruits we believe it is our duty to have them at all seasons of the year and in greatest abundance. We believe also in currants and gooseberries and all varieties, but not so firmly as we do those of strawberries. Our reasons for this are private, but nevertheless we believe in them. However, we most firmly believe in the free and untramelled use of the whole of the following list of superb native fruits, viz. :—Apples, pears, plums, cherries, peaches, and grapes, and these in all their endless variety of sorts and kinds. In these fine fruits is an almost endless diversity of quality, as hard and soft, as sour and sweet, as woody and melting, as strong flavoured and insipid, as buttery and as sugary, but still we believe in them. We believe they all have an appointed place to fill, a work to do, and a use to exert, and a character to sustain. Whether their origin was recent or remote, whether at home or abroad, whether in England or Ireland, or Scotland, or on the continent of the old world, whether on the continent of the new world, or in the still more stern and trying influences of Canada, wheresoever their early home may have been, we still believe in them, and welcome them. We believe also in tropical as well as temperate fruits. And those of all sorts, whether they may be called oranges or lemons, from the torrid and tropical regions of California or Florida, or whether dates or figs from the more tropical clime of the East India Islands, or whether they may be limes or bananas, we would still use them, and relish them and be thankful for them. But in our endless and varied wealth of rich and tempting fruits suitable to our condition and clime, we are most happy to say we need never covet the tropical fruit of the southern zone. Our basket of fruit is so rich, so varied, so tempting, so seasonable, so luscious and delightful. Under whatso-

ever supervision and artistic training, or delicate manipulation they may have been subjected ; we would also thankfully accept them as a blessing to mankind. Though they may have originated in the untired and patient labours of a Van-Mons of Europe, who spent a long and valuable life in the service of the delightful and buttery pear, and who started so many fine and standard varieties for the service of the world, they may be thankfully accepted. Though they may have come from under the scholarly tuition and masterly training of a Thompson, the head of the Royal Horticultural Gardens of England, or of a Dr. Lindley, or a Thomas Andrew Knight, or a Kenrick, or a still more famous, De Candolle, of Geneva, a gentleman to whose manly and masterly skill, and indefatigable labours we are so much indebted for so many improved pomological treasures ; we thankfully receive and cherish them. Though they may have come from the still more recent successful labours of a Kirtland, of Cleveland, Ohio ; a Rogers, of Salem, Mass. ; a Wilder, of Boston, Mass., whose memory is so widely and deeply cherished as a national blessing ; or a Clapp, of Boston, Mass. ; or a Miller, of Bluffton, Mo. ; or an Ellwanger and Barry, of Rochester, N.Y. ; or a Downing on the Hudson, N.Y. ; or a Saunders or a Dempsey or an Arnold, of home and Canadian fame in the origin of fine table varieties of fruits, still they are most acceptable, and to be taken with devout thankfulness. They are to be received too, in all the varied and honoured names and designations they bear upon their fair faces, and by which they are severally known. These are sometimes remembrances and bring afresh to our thankful minds the noble figure or still more noble deeds of the noblest of man ; of a Knight, of a Napoleon, of a Rivers, of a Lindley, of a Kenrick, of a Cox, of a Diel, of a Knox, of an Alexander, etc., all of European fame. Still more recently, we have the names upon our fruits of men of home and continental fame, as Wilder, as Saunders, as Downing, as Madison, as Jones, as Manning, as Kirtland, as Longworth, as Elliot, as Rogers, as Talman, as Dana, as Hovey, as Ott, as Platt, as Rea, as Coe, as Coolidge, as Crawford, as Hale, as Hyslop, as Sturtevant, as Barry, as Herbert, as Houghton, as Moore, as Morton, as Allen, as Williams, as Andrews, and a host of others whose honoured memories we love to cherish.

Our earnest and best advice then to the people of this whole country, and from whatever part of the globe you may have come, to the high and to the low, to the noble and to the degraded, to the learned and to the illiterate, to the rich and to the poor, to the skilled and to the dunce, to the righteous and to the unrighteous, to the male and to the female, to the young and to the old, to the white and to the black, to the bond and to the free, without any distinction of station, or sex or colour, or creed, or politics, whosoever you may be, or whatever may be your name, USE FRUIT. Give it constantly and plentifully to yourself, whom you deeply esteem, to your wife, in whom you sincerely confide, to your son, in whom you delight, and to your daughter whom you love. Give it without stint to your man-servant and to your maid-servant, on whom you rely, to your ox and to your horse, which you so highly value, and to the stranger, whom you are bound to respect, within your gates.

Furthermore, and above all, we most devoutly believe in fruit, because it directly points us to God and leads us to think of Him as the "Giver of every good and perfect gift." This we consider to be the highest and most precious service in the whole history of our fruits.

We have thus attempted in a feeble way to show the intrinsic value of our native staple fruits, as well as all fruits soft shelled and hard shelled, and some of the reasons why they should be more generally placed upon our tables, upon our dining tables, upon our tea tables, and upon our festive boards for supberb occasions, for our use and comfort. While we are very anxious to produce good fruits for export, fruits well-fitted for the English market, we see at the same time very little good fruit placed upon the table of our peasantry, as though it was perfectly fit and proper for the Englishman to use, but not good for us. We emphatically teach the contrary; place it upon your tables in a natural state, in a prepared state, for the meal, for desert, for use, and our humble word for it, the public health and the public purse would be the gainer.

At this stage the Association adjourned till two o'clock.

Upon the President resuming the chair, MR. BEALL, Lindsay, read the following paper:

THE FRUIT GARDEN.

"What soil, and what conditions of the surface soil would best conduce to the proper development of apple trees?"

While the apple tree is being so generally and often so successfully cultivated throughout the country, it seems unnecessary to give any minute description of a suitable soil for that purpose. The general intelligence of our people has led to the establishment of the idea that land, which will produce a good crop of wheat or barley, ought to be suitable for an orchard, and in this they are mainly correct, as the cause of failure is not so much in the kind of soil selected as in the lack of knowledge as to the preparation and after treatment of the surface soil.

A large portion of the surface soil in Ontario is of a clayey formation, and is usually described as clay, clay loam, sandy loam, loamy clay, &c., but which may be described generally as calcareous clay, with a greater or less quantity of humus or vegetable admixture.

The fertility of such a soil depends largely on its physical properties, perhaps more so than on the chemical combination of its elements. In its natural state, where clay predominates—and it generally does with us—its power of cohesion is so great that it will not readily permit water to percolate through it, it has but little power to absorb moisture by capillary attraction, to absorb gases, or to retain heat. The physical properties of this soil must, therefore, be materially changed, before apple trees can make such healthy and vigorous growth as to make their cultivation remunerative.

The conditions of the soil which seem to offer the best promise of success are: first, that it shall contain the necessary combination of chemical elements, and then that the surface soil should, by mechanical means, be made incohesive, permeable, friable and mellow, to the depth of eighteen inches or two feet, and that it should be dark coloured, and also that ample provision be made by underdraining or otherwise, for the percolation and carrying off of all superfluous water, then it will readily appropriate from the atmosphere the three great desiderates of vegetable growth, air, heat and moisture. Trees planted in such a soil will have ample room for the ramification of their roots for a very long period of time, and if the soil, by mechanical means, is kept in the state indicated for eight or ten years after planting, the trees will not decay through loss of a large portion of their lower roots, by rotting in stagnant water, as is frequently the case in undrained soil.

In the spring of the year, the season of growth will commence much earlier in land so prepared. The under-drains will have carried off all superfluous water early, and therefore, its warmth will not be lessened by evaporation from the surface. On the contrary, it will be enabled to absorb and *digest* the warm spring rains and the sun's rays from two to three weeks earlier than soils left in a state of nature, or if only cultivated to the depth of a few inches. As a proof of how readily a suitably prepared soil will absorb moisture even in the early spring, I may mention that, on the 26th of April, 1880, between four and five o'clock in the afternoon, and while the thermometer stood at about 60° Fah., rain fell to the depth of 29 inches, which will be about 32 tons of water to the acre; every drop of this, which fell on a portion of my garden that had been, for some years, in a high state of cultivation, was entirely absorbed, while uncultivated land, but a few rods distant, did not absorb any perceptable portion. Here then, was a large quantity of water, heated by its passage through the atmosphere to nearly 60° Fah., passing quickly into the soil, taking with it a portion of the soluble part of the manure which had been liberally applied to its surface, thereby assisting greatly to raise the temperature of the soil to the point at which the germination of seeds and growth of rootlets commences; namely, to about 53° Fah. The next day this piece of land was sufficiently dry for working.

Colour too has much to do with the temperature of the soil, and it is easily shown that a dark soil will absorb heat and retain it much better than a light one. If two

flower pots of equal size and quality, but one white and the other black, be filled with dry calcareous clay taken from some cool place and exposed to the rays of the sun, it will be found that the temperature of the soil in the white pot will not increase more than sixteen degrees, while that in the black one will increase 24 degrees. Therefore, if the surface soil is too light in colour, it should be darkened, and this can readily be done by applying a sufficient quantity of barn-yard manure, but where such an application is not desirable, as in a young orchard, probably swamp muck might answer a better purpose.

Well cultivated and thoroughly under-drained soil will withstand our occasionally severe summer droughts much better than soil not so prepared. Perhaps it may not be generally known that a very large proportion of the moisture necessary for the support of vegetation, during the season of growth, is obtained from the subsoil. Many proofs may be given in support of this theory. One of the most obvious is the numberless springs which abound throughout the Province, at points much higher than the general level of the surrounding neighbourhood. Another proof is the fact—which may not be quite so obvious, although more satisfactory, when obtained—that, after a few days' heavy rain, subsequent to a long season of drought; water, or the subsoil saturated with water, can often be found in undrained land at a depth of two or three feet below the surface; while the rain water which had lately fallen had not penetrated the soil more than eight or ten inches. The intermediate stratum being absolutely dry, and this in places where, had an examination been made before the rain fell, the subsoil, to the depth indicated, would have shown no sign of moisture. If a supply was not obtained from this source, many of our own trees and most of our agricultural crops would have been utterly ruined during the prolonged drought of the last summer. As it is I am afraid much permanent injury may result to fruit trees in undrained soil from this cause. The tiny rootlets penetrate the earth in search of the retreating moisture during a dry season, to a much greater depth than during a wet one. When heavy rains set in, the subsoil becomes unduly saturated, and the rootlets, not having the power to retrace their steps, must of necessity remain buried in the cold, wet subsoil until late in the following summer, and before that time the roots become diseased by cold, excessive moisture, and the lack of the needed stimulants of heat, air and other gases. The poison is absorbed into the tree in early spring, generally causing permanent injury, often proving fatal to the tree.

Ten acres of land planted with healthy, well grown apple and other trees, carefully set in rich, loamy soil, overlying a calcareous gravelly clay (such as largely predominates throughout this Province), properly subsoiled to the depth of two feet, thoroughly underdrained by drains at least four feet deep, and carefully cultivated every year for seven or eight years. by growing potatoes and mangolds or other root crops will, in my opinion, from that time forth, prove to be a more profitable permanent investment than can possibly be realized from fifty acres of land devoted to any agricultural purpose whatever.

Mr. Beadle submitted the following:—

REPORT OF THE COMMITTEE ON THE SIZE OF FRUIT PACKAGES.

The difficulty which met your committee in recommending a uniform size in berry and fruit baskets, was the stock of these articles in the hands of shippers, which they, the Committee, recognise as a certain vested right. It is, therefore, decided that the date of the coming into force of the proposed regulations be deferred to some future date, to be named in the Act.

Your committee recommend that twelve imperial quarts, equal to $831\frac{1.8}{1.0.0}$ cubic inches capacity, be the standard of baskets or boxes used for shipping peaches, pears, cherries, plums, etc.; and that three half pints be the size of the berry basket for strawberries, raspberries, and other small fruits; and that the size of the apple barrel be the standard Canadian flour barrel, the dimensions of which in the bulge to be . . . . inches in diameter, the size at the ends to be . . . inches, and the length between the heads

to be . . inches—measurements to be made inside of the barrel; and that a petition be forwarded from this Association to the Legislature at Ottawa requesting that the views expressed may be carried out.

P. C. DEMPSEY, *Chairman.*
P. E. BUCKE,
A. M. SMITH,
CHARLES DRURY.

MR. BEALL moved, seconded by Mr. Honsberger, for the adoption of the report.

MR. BUCKE.—In almost every article of commerce we have a standard of measures and weights; and as this report is going down from the Fruit Growers' Association of Ontario and not from the committee, it is as well that it should be endorsed by the Fruit Growers' Association with a view to an Act being passed on the subject similar to that which was passed when the change was made in the gallon a few years ago.

MR. BIGGAR.—Twelve imperial quarts in a peach basket would be equal to the contents of a fourteen-quart basket; and it was said yesterday that a fourteen-quart basket was too large for shipping peaches if they are any way soft.

MR. ORR.—Twelve imperial quarts would be more, I think, than a person would want to ship in one basket. The present basket containing twelve quarts is considered large enough for peaches. This is to be twelve imperial quarts; and it would probably hold more than the fourteen-quart basket.

MR. DEMPSEY.—I thought the peach basket held twelve imperial quarts.

MR. ORR.—I am not sure.

MR. HONSBERGER.—I have measured them frequently; and they hold twelve imperial quarts.

MR. DEMPSEY.—As chairman of that committee I have no hesitation in saying that if the basket holds twelve quarts, Winchester measure, we would be willing that it should be changed to ten quarts; but the view of the Committee was not to change the size, but to have a uniform size adopted.

The motion was adopted.

MR. ALLEN submitted the following report of the committee on new fruits:—

REPORT ON NEW FRUITS FOR THE YEAR 1881.

To the Fruit Growers' Association of Ontario:

GENTLEMEN.—Your Committee beg leave to present the following report, compiled from sub-reports received from growers in almost every section of the Province. While we have to acknowledge the prompt courtesy of many growers in the Province who replied to our enquiries, we have to complain that many never replied at all, although we faithfully reminded them by circular of their duty in this respect. Out of two sets of circulars issued, numbering four thousand in all, which we sent to growers in every county, replies were received from one thousand one hundred and twenty-three, many of these being merely a card of acknowledgement stating that there was nothing to report. We believe, however, that a much deeper interest will henceforth be taken in reporting these matters, as our first report is now about being distributed through the Province, and growers will see the desirableness of these reports. In this report we have included fruits that are old varieties, but are being introduced either into the Province or some particular section of it.

STRAWBERRIES.

Sharpless still heads the list in the district about Toronto. The best for size and a fair cropper in Wellington, Perth, and Waterloo. Varies more in the Ottawa district than any other—some growers speak highly of it while others would not give it garden

room. At Arkona it is not considered a first-class berry by any means; its only good points are large size and solidity in the estimation of growers in this section. The best at Whitby, quite hardy. One of the most valuable in the Niagara district.

Crescent Seedling grows and bears well at Toronto. At Guelph it is a good market berry. At Arkona this is considered the coming berry for market and family use, hardy in plant, and large uniform fruit of fine flavour and good colour, carries well. One of the best at five different points in Ontario county. Highly thought of by growers in the Niagara district for its heavy fruiting quality and the fine marketable appearance of the fruit. Good at Clinton.

Jucunda does not succeed so well on heavy soils. Indeed, the reports from all sections are so varied that we do not feel inclined to give it a high character.

Captain Jack is considered a profitable market berry at Arkona, solid attractive fruit of the Wilson type in flavour. A favourite in Haldimand and Halton.

New Dominion is well spoken of in the counties of Stormont and Dundas. It is said by some there to come in a few days after Wilson's Albany, while others say it comes about the same time. Bears well and comes in after Wilson's Albany in Frontenac, but not so much thought of as regards flavour, and is softer to handle. Proves very valuable at Ottawa—large even berries, fine colour for market, and a uniformly large cropper. At Arkona it is liked, and promises to be an acquisition for market value; hardy in plant and of good character generally. At Hamilton and through the Niagara district it is looked upon as one of the most valuable varieties for a local market. Fair grower at Clinton.

Alpha (Arnold's No. 8) has done well the past season at Stratford, and in Oxford, Elgin, and Victoria counties; and in the vicinity of Prescott one grower prefers it to Wilson for quality and local market profit.

Mr. John Croil, of Aultsville, has imported from Scotland the following varieties, all of which appear to grow well, and will fruit next year: Alice Maria, Brown's Wonder, Dr. Walker, Frogmore Pine, Viscountess de Harcourt, and President.

Kentucky bears large crops at Kingston; comes in with New Dominion, and is well suited for a local market berry, coming in after several others.

Arnold's Pride (No. 23) still holds its good reputation at Ottawa for productiveness, colour, and size, and is evidently proving itself an acquisition generally over the Province. It is the finest berry we have in Huron for family use. Growers prefer it to any other for home use. At Windsor and St. Thomas it is highly spoken of, and several growers say it will ship fairly well to the city market. A good family berry at Stratford.

Cumberland Triumph is considered one of the most promising berries, resembling Crescent in some points, but some growers think it finer in flavour. Very productive and uniformly sized berries.

Windsor Chief, early, large, good colour, and fine flavour, suits well for family use, but too soft to suit the market.

Glendale is liked at Arkona, Windsor, Brampton, and some parts of Wellington, Wentworth, and Waterloo for a late sort, both for family and market. Considered better than Kentucky.

Arnold's Maggie at Arkona and several parts of Huron, Perth, and Lambton is looked upon as one of the most promising of the Wilson type, and superior to that berry in both flavour and colour. Liked for family plots in Brant and Kent.

Bright Ida (Arnold's), in Lambton and Perth is said to be a large bearer and rich in flavour, giving the strongest fragrance of any variety.

Marvin is spoken of at Arkona as a promising variety.

Miner's Prolific is evidently not widely known, but generally esteemed where planted.

Bidwell is not well spoken of in Essex and Kent, but considered promising in Ontario, Wentworth, and Peel.

President Lincoln is liked at St. Catharines, Grimsby, and Drummondville, but at Peterboro', Stratford, and Sandwich they think it unnecessary while we can get Sharpless, which, taken on all points, is considered better.

Early Canada appears to be the coming berry if we judge by the reports of three of the growers in the Niagara district, who claim it to be earlier than Wilson, as good a shipper, and better in quality for table use. Four others in the same district think it no better in quality, about as good a shipper, but some days earlier. One grower says this variety will bear better than Wilson for one crop only, and that it won't pay for a second crop from the same plants.

RASPBERRIES.

Col. John McGill, of Oshawa, has a seedling black from the Doolittle—fruit smaller five or six days earlier, and sweeter than that variety.

Saunder's No. 55, sent out two years ago by the Association, is the only one that gives good promise in Ontario county. Colour is not liked as a rule, but it is a strong grower, and hardy. Mr. D. B. Hoover, of Almira, thinks it inferior to Philadelphia, although it is hardy and bears well. Colour is said to be against it for market. Has proved a strong grower and perfectly hardly at Kingston. At Arkona it has fruited and grows well, but is not placed in the front rank. Mr. J. K. Gordon, of Whitby, says it has done well with him ; is a black cap, not quite so large nor so black as Mammoth Cluster, sweet and pleasant. Has grown well and fruited, and gives satisfaction for family use in Huron.

Philadelphia is considered altogether one of the best grown in Frontenac. Good and hardy in Wellington and all counties to the south and west. Colour is against it for market value. One of the best at Clinton.

Brinkle's Orange.—Winter kills it in Frontenac, Durham, Stormont, Prescott, and parts of Ontario. Is considered a heavy bearer and of good table quality in first two mentioned counties. At Clinton is liked for its season best.

Clark is favourably reported on from Frontenac ; is hardy and productive. At Arkona it is considered the best of any for family use, productive and hardy, fine flavour, large, good colour. Liked well in Ontario county. Not always hardy at St. Catharines.

Mammoth Cluster is considered as well suited to the soil and climate of Frontenac, Victoria, and Elgin.

Mr. P. E. Bucke, of Ottawa, reports that all the seedlings raised from the Saunders' hybrid fruited well the past season. They consist of four reds, two blacks, and a white. They were not protected the past two winters, and yet appear quite free from the effects of frost. One of the reds is like its parent, an exceedingly strong grower, and, although standing in poor soil, sends up tremendous canes, which branch considerably. From this plant a large crop was picked the past season—nearly three times the crop yielded by any of the others. It does not sucker much more than a black-cap. The fruit of these plants is quite distinct in shape, and all good. The white is the weakest grower and the poorest berry. The black-caps are both prolific and strong growers ; one is very thorny, the other nearly smooth. The year before last Mr. Bucke sowed some more seeds of the Saunder's hybrid, but only two plants were obtained. They are growing well and will fruit next season. The canes of the reds are very dark in colour, and covered with stiff prickles, excepting one which is light-coloured and smooth. Doubtless, if these seedlings were taken in hand by some experienced propagator and thoroughly tested they would prove quite an acquisition to the raspberry list.

Queen of the Market is so nearly like Cuthbert that several growers do not see any object in cultivating both.

Turner is a strong grower, large fruit, firm, and of good quality. Growers at Arkona consider this the most promising berry for general cultivation. In Grey, Bruce, and Wellington it is thought highly of. Some growers would discard it on account of tendency to sucker.

Cuthbert is considered the coming red in many sections of the west and south. One of the best at Whitby. Hardy berry, good quality, fine colour, and good shipper.

Ganargua of the purple caps is said to be the best in cultivation in Lambton. The plant is hardy, and produces large crops of fine fruit. It is readily propagated by the tips.

Gregg holds its own well, and in some western counties increases in popular favour. One noted grower says of its good points: "It is later in ripening, hangs longer on the bushes, is more even in size, a little higher in flavour, and commands a higher price than Mammoth Cluster." Another grower, lost for want of strong enough words to express his views, exclaims, "It is simply immense."

Highland Hardy seems to be liked only for earliness, other qualities being against it by the evidence of all growers.

Niagara, a cross between Clark and Philadelphia; strong grower, large berry, not quite so dark in colour as Philadelphia, very productive, and a good shipper. It comes into season after Clark, which is likely to place it high in the estimation of growers generally, and its quality is superior to Philadelphia. Mr. A. M. Smith, of St. Catharines, is the originator of this variety, which we believe to be worthy of general cultivation through the Province.

Thimble Berries are reported from most of the eastern counties as very valuable for table use. They command a ready sale in all the local markets. Rank growers and regular bearers. A fine shipping fruit, and in preserving or eating raw takes little sugar. In Bruce the Germans make a very palatable wine from this berry, and the Saugeen Indians pick and ship them in large quantities to the city markets. They grow mostly in rocky bluffs and along upland pine woods, but will grow in any soil desired.

CURRANTS.

Lee's Prolific has been reported upon from almost every county in the Province, with various degrees of success. Some say without the slightest hesitation that it is only the Black Naples under a different name, but the more reliable agree that is is distinct, although some think it is no better than Naples; while others call it better in every way, a larger cropper and much finer for preserving. One grower in Peel says he can make as much at six cents per quart on Lee's as he can at ten cents per quart on Naples. He claims, as well as several others, that Lee's must be regularly manured and pruned in rder to give best results.

Saunders' Seedlings are said to be worthy of more prominence than they have yet been accorded, and we hope another year to be in a position to speak specially upon their individual merits.

GOOSEBERRIES.

In Glengarry, Stormont, Dundas, and parts of Prescott and Leeds we have reports that all gooseberries mildew so badly that growers do not care to give them further trial. Even Downing's and Houghton's seedlings have not escaped in Stormont.

Mr. Noah Sunley, of Guelph, imported fifty varieties from England, and has given them a fair trial with the following results: He finds the varieties that have shining leaves the hardiest and best croppers, and free from mildew. He finds the best varieties are *London Marigold* and *White Smith*. Those that have soft downy leaves are most liable to mildew.

Mr. J. K. Gordon, of Whitby, has a fine collection of gooseberries, including some of Mr. Roe's seedlings, and several leading English varieties. All grow well, are hardy, and

quite free from mildew. In planting he digs the holes wide and deep, and fills up with a mixture of loam and coal ashes, upon which he plants the bushes, and afterwards applies a liberal mulch of black loam, coal ashes, and manure.

Mr. James Dougall, of Windsor, has the following seedling gooseberries, which he has selected as possessing more or less merit:—

No. 1, from the seed of an English variety crossed with Houghton. Berry something larger than Houghton, oblong, deep green with light veins, quality good.

No. 2, same parentage; berry a little smaller than No. 1, almost round, green with a yellow tinge, flavour good, richer than No. 1.

No. 10, from the seed of Houghton fertilized with an English variety, oval, not quite as large as Downing and about same colour, good to very good.

Hybrid Seedling, No. 2, from the wild prickly variety crossed with an English gooseberry, oval, with a sprinkling of slender hairs, same size as Houghton, straw colour, covered with red dots, quality good.

Hybrid Seedling, No. 7, descended from the prickly wild crossed with an English berry, oval, covered with fine hair, large, dark purple, quality good to very good. Mr. Dougall believes this and the Hybrid No. 2 will become two of our most popular berries. The bushes are strong, upright growers, and not subject to mildew. They seem perfectly hardy, and bear regularly large crops.

Elderberries are becoming valuable for wine-making, and many use them for stewing into a sort of preserve, and in making pies. They are so sweet that they take very little sugar. The plant is a regular bearer of umbrella shaped clusters. The white flowering variety is generally considered better than the pink.

APRICOT.

Mr. D. B. Hoover, of Almira, has a Russian seedling, a hardy, fast grower, and good bearer.

CHERRIES.

Empress Eugenie, said to be the hardiest of any grown in Waterloo county, and a Galt grower says its fruit is much finer than Early Richmond.

Windsor, one of Mr. James Dougall's seedlings, almost black, very productive, hardy, small stone, fruit medium size, juicy and refreshing.

Mosely Favourite.—We thus name a supposed seedling fully described in our report of last year. The original tree continues to bear immense crops of very fine marketable fruit, which is bought up eagerly for preserving in Goderich. It has never shewn the slightest trace of disease in any shape, and we believe it to be hardy enough to grow anywhere in this Province.

GRAPES.

Brighton does well in Ontario county, where it is grown pretty generally. Spoken well of in York county for growth, and in Bruce, Perth, Waterloo, Wellington, Essex and Lambton for growth and hardiness. Very few complaints of killing. Considered one of the best three at Whitby. Likely to become a general favourite in the section around Arkona. Is tender at Whitby according to one grower. Promises well in Oxford; and said to be an acquisition in Elgin. Strong grower in Huron.

Burnet mildews in Ontario county, and comes in a little after Concord. Grows rampant in York, berries uneven in size, loose bunch, do not ripen evenly; but we have no complaints of mildew from that section. It seems to mildew badly all through the western parts of the Province. At the West Riding of Huron Show at Goderich the finest out-door grape upon the tables was Burnet, grown by A. M. Ross, M.P., who says it shows better so far than any grape he has. The bunches were compact and large, with

quality first class. Vigorous in growth in Frontenac, but a shy bearer; some report it as equal to Black Hamburg. Grows slowly in McGillivray township, in Middlesex; has not fruited yet, but looks healthy and hardy. From the Ottawa district we get the encouraging report that the Burnet has fully realized every anticipation of the fruit grower. They call it a "glorious variety." One grower said that the "originator deserved a monument from his country." Some growers in that section complain that in some instances the grapes, when they had attained nearly half their size, stopped growing and ripened early, but the flavour of these was perfect although they were seedless. Can some experienced grower account for this peculiarity? Is it occasioned by a want of fertility in the pollen? Burnet was winter killed at St. Catharines, and in two cases in Middlesex, one in Waterloo, three in Perth, and four in York. A prominent and intelligent grower at Whitb classes this as the poorest variety among a long list that he cultivates. He says it is better flavoured than the Champion, but its bunches are very imperfect, seeds large, skin thick and tough, very late in ripening, and so liable to mildew. He has the past fall dug up the plant and replaced it with another variety. A remarkable grower at Arkona, and fruit good. At Peterboro' it has done well and gives satisfaction in a majority of cases reported. In Oxford, Kent, Essex, Victoria, said to be a very strong grower. Has fruited satisfactorily in Northumberland, Russell, and Prince Edward counties, and one grower near Cornwall thinks it one of the best in very way he has seen.

Early Dawn is too small in bunch to be of market value, when compared with other varieties coming in the same season.

Mr. J. K. Gordon, of Whitby, is testing over fifty seedlings, mostly from Champion and Delaware. Some are very vigorous in growth and give promise of strong constitutions. They will be reported upon hereafter according to merit.

Peter Wiley.—About same form as Duchess, half shouldered, compact, large berry, slight musky flavour, and unpleasant after taste, white.

No. 1, or Downing, large bunch and very large berry, resembling Black Hamburg in form. Specimens examined were not fully ripe; colour dark to reddish. It might suit well for curing to raisins.

Mr. D. W. Beadle, of St. Catharines, has two white seedling grapes of great promise. No. 1, named *Jessica*, is medium in bunch and berry, little loose in form, very sweet, skin tough and pleasant to chew, berries adhere well to stem, good to very good, foliage strong and vine a good grower. No. 2, large bunch and berry, shouldered, flavour not so rich as No. 1, but good. Both these give promise of value, and certainly are superior in general character to any of the new white grapes now being introduced.

Prominent among Canadian hybridists we have Mr. W. H. Mills, of "Fernhurst," Hamilton, who has done so much to bring to perfection and stimulate the hybridizing of grapes. Out of a large number he has now selected the following five, which possess more than ordinary excellence. They possess in common an entire absence from foxiness, freedom from pulp and colouring matter in their skin. They are meaty, with skin adhering to the flesh like the Bowood Muscat, apparently as hardy as our long-cultivated varieties, standing in an open three-acre garden without protection along with about fifty other varieties, among which may be found many of Rogers' hybrids, Delawares, Concords, Crevelings, Diana, Iona, Hartfords, and many others, affording the best opportunity for comparison.

Lavega, a cross between Chasselas and Diana, red, very thin skin, medium to large, compact in cluster, larger than Diana, ripens about 1st of September, wood short jointed, foliage strong and good; one of the sweetest open air grapes we know of.

Mills, a cross between Black Hamburg and Concord, cluster large and well shouldered, berries large and black, covered with bloom, ripens with Concord, vine a strong free grower with excellent foliage.

Sultana, produced from Muscat Hamburg for male, and Creveling for female, black, very large cluster with heavy shoulder, thick skin, will keep easily until mid-winter. The

berries adhere so strongly to the cluster that a one-pound cluster may be lifted off the table by a single berry. Probably the finest shipping grape we know of; could easily be shipped to Europe. Foliage fully as strong as Concord; ripens with Concord.

Tena is probably the best of Mr. Mill's hybrids for market. It closely resembles Black Hamburg in size, colour, fruit, and flavour. Foliage light, but stands well all changes of weather; ripens with Concord. This hybrid is a cross between Muscat Hamburg and Creveling. When Mr. Mills got this variety into bearing he was so well pleased with the fruit that he gave up using under glass grapes. It is a most delicious grape.

Darwinii, white transparent, high flavoured, medium sized cluster and berry, good strong foliage, not a very strong grower, fruit with the slighest pulp which breaks down in the mouth, has but one seed. This is a cross between Bowood Muscat and Diana; ripens late, a fine table grape.

The following were exhibited at the Provincial Exhibition last fall, by growers in N.Y. State:—

Empire State, white, bunch resembling Delaware in form, berry larger, but altogether does not appear to possess character to recommend it for cultivation in the face of many better sorts.

Bacchus, a black wine grape, resembling Clinton in size and form of bunch; strong wild strain, especially in after taste.

Montgomery, very large bunch, white, skin crisp, pulp watery and melting, pleasant acid, quality fair to good.

Excelsior, red, does not appear to ripen evenly on bunch, skin breaks, flavour pleasant, sprightly, refreshing, good.

Duchess, resembling Prentiss in size and form of bunch and berry, white, flavour sweet, inclined to insipid, lacks character.

Prentiss holds its position well and will undoubtedly gain in popular favour as it becomes known. It ships well and is of that sized bunch and berry that will give it market value, while its good to very good quality will place it in favour for table use generally. Pity it does not ripen earlier and a better grower.

Jefferson did not impress us favourably the past season. While quality was good, pulp melting, skin tough, bunch and berry large, it did not appear to ripen evenly, nor come in as early as we would like for this country. But further test will show better its good and bad points.

Lady Washington, large bunch with medium berry, shouldered, flavor mild and most agreeable, a grape that one could eat a large quantity of and not tire. But it seems to have the objectionable feature of shelling, and is too late to be desirable.

Pocklington is variously reported upon. In the Niagara district opinions are becoming more favourable, while in Essex, Middlesex, Huron, York, and some other sections it is said to be a slow, and not strong grower. We have examined the fruit from Niagara section, Whitby, Prince Edward county, and Rochester, and found it very variable. That grown by Mr. P. C. Dempsey was fine in appearance, but the berries shelled from bunch badly. Four bunches from Rochester, when received every berry was off the stems in the package. From Whitby the berries were firm on bunch. Altogether it maintains its fine appearance for size of bunch and berry, quality medium, decidedly foxy in odour, but much less so in flavour, pulp rather tough. In some cases did not appear to ripen evenly on bunch. From its fine appearance it will doubtless command a ready market for a time, but it can never be esteemed by the cultivated palate.

Albino, one of Mr. Haskins', has improved in our estimation, judging from specimens tested in September. Matures about the same time as Concord, and has proved quite hardy, foliage a good deal like Delaware, bunch large, slightly shouldered, juicy, sweet, good.

Yellow Concord (Haskins'), is a seedling of Concord crossed by Allen's Hybrid, very

prolific, hardy, thick green leaf resembling Concord somewhat, seems perfectly free from mildew, bunches medium to large, berry large, compact, pleasant acid flavour, melting, but a slightly unpleasant aftertaste by chewing the skin. It is free from the pulpiness of Concord and the foxiness of Pocklington and Niagara; and will likely take a front rank among white grapes in Canada.

Abyssinia (Haskins'), black, green stem, bunching very large, thin skin, pulp tender but not strictly melting, stem and form of bunch resembles Burnet, skin can be chewed without imparting any unpleasant flavour, quality good to very good.

Champion does not appear to gain in favour anywhere in the western parts of the Province, but is considered a good market variety in the east. At Kingston it bears well, is hardy, and forms fine bunches. But those who have tested Moore's Early in the east say that it will very soon take the place of Champion. Was ripe August 28th at Arkona the past season. Gave the third largest crop at Whitby, Isabella being largest, and Concord second. Considered too poor a quality at Clinton to be worth growing.

Eumelan is hardy in Frontenac, bears well, but bunches do not set compactly. Winter killed in Middlesex. A fine family grape in Oxford, Elgin, Essex and Peel. Considered second rate in Waterloo. Not compact enough in bunch for a market fruit in Kent and Huron.

Salem, considered one of the best grapes in Frontenac, hardy, and quality good to very good. Winter killed in Middlesex. One of the best three grapes at Whitby. The finest outdoor grape, says a grower in Brant. Mildews in Huron, Peel, Oxford, Norfolk and York.

Othello is rather late in ripening to be of value in Lanark, Renfrew and Frontenac. It has been introduced into the vineyards in France, and thought highly of for producing a red wine.

Dempsey's No. 25, white, quality good, but has not ripened uniformly well in Russell, Northumberland and Carleton. It appears to be too late to suit any of these eastern counties. Those who have fruited it and matured it perfectly report it as one of the highest flavoured outdoor grapes. Very subject to mildew in many sections.

Chasselas de Fontainebleau is being extensively cultivated in the open air at Ottawa, and ripens with Delaware. Its splendid bunches and general beauty makes it a favourite on the market, where it brings the highest price of any open air grape. It is an old foreign variety, subject to mildew in western Ontario.

Worden is considered the best of any for general good qualities at Whitby. Does well at Jordan station.

Martha is considered the finest white for vineyard purposes at Arkona; it is very hardy, good grower, large compact bunch and large berry with good flavour. Killed last winter in Ontario county and Simcoe. Does not succeed at Clinton. Is not esteemed in Brant.

Moore's Early has been fruited on the grounds of several Niagara district growers as well as some others, and the general opinion is in favour of its coming into general cultivation. Several eastern growers think it will displace Champion in popular favor, as it comes in fully as early and averages a better market size, besides being of superior quality. But from four growers we have advice to be cautious in adopting this variety, as they say it is given to crack. Medium grower and bearer at Whitby, and strong in Huron.

Mr. Charles Biggar, of Drummondville, has a fine seedling white grape of good quality, but ripens rather late to suit the northern parts of Ontario, its season being about with Isabella. Mr. Biggar has another seedling strongly resembling Delaware, but larger and a ranker grower, and it is likely to come in a little earlier. We expect upon further careful test to find this one prove of considerable value.

Lady has fallen down low in our estimation; said to be a poor grower; it certainly is poor in bunch and berry, In fact, its only good point as far as we are able yet to judge is its earliness, which, under all the circumstances, is not sufficient to compensate

for the bad qualities it has, especially in the face of other varieties coming in as early, and better in other respects.

Belinda, one of Miners' seedling white grapes, said to be a strong grower and good bearer and as early as the Concord, but cracks so badly as to unfit it for cultivation.

Senasqua has grown well in nearly all the western counties of the Province, and is said to be strong and vigorous at Belleville and Gananoque. Strong grower in Huron.

Niagara has not fallen in our esteem, but still easily holds a high position among white grapes for market. It is undoubtedly one of the hardiest grapes yet introduced, if we can judge from its great leathery foliage and the lateness in shedding. From the vineyards planted we get the highest recommendations for its thrift and hardiness, shewing that the constitution is strong. We have every assurance from growers at Lockport and those who have seen it there, that it is prolific, and certainly the bunch and berry are of a sufficiently large size to command top prices in market. In foxy flavour it resembles its parent, the Concord. A Whitby grower is testing this variety, and thinks it will prove quite hardy and a strong grower.

Carlotta, a seedling white grape, is said to be a good grower, productive, ripens with Concord, and as good in quality in every way; but it cracks badly, which destroys its usefulness for general cultivation.

PEACHES.

Mr. Isaac French, of Oshawa, has a seedling resembling Early Crawford, seems hardy and likely to become valuable for that section.

Ott's Beauty, a yellow fleshed seedling, grown by Mr. George Ott, of Arkona. It is large, good quality, and ships well. It also comes true from its own seed, and growers in that vicinity are planting extensively of it.

Early Canada is not coming up to expectations in Essex and Kent. At Arkona growers complain of it as being no better than Amsden's June, although ripening about August 5th; it is small and intensely cling. Along Lake Ontario and the Niagara River it comes in earlier, but is generally considered almost identical with Alexander, Amsden's June and Harper's Early, excepting perhaps that the latter may be somewhat better in flavour.

Charles Friers, of Clandeboye, has several very promising seedlings of considerable local value.

Seedling Peach No. 1, grown in Essex, large yellow, free stone, sweet, not very juicy, but rich and good, ripens September.

Seedling Peach No. 2, grown in Essex, under medium size, yellow, very juicy, rich and tender, pit unusually small.

In the vicinity of Beamsville there are a great many seedling peaches grown. Orchards of several hundreds can be seen there with some samples of very fine fruit. Mr. J. C. Kilborn has paid considerale attention to the growing of seedling peaches, and after many years of trial has selected three of more than ordinary excellence to propagate from.

No. 1, high coloured, yellow flesh, free stone, comes in a little before Hale's Early, above medium size, a good shipper and not subject to rot.

No. 2, very large, nearly round, high coloured cheek, deep rich yellow flesh, free stone, of high flavour, ripe about a week before Early Crawford; tree very thrifty, hardy, and a regular bearer; considered altogether the most valuable peach in this section for market. Generally the fruit has to be thinned out, so heavy does it bear; and the past season, although so dry and soil very light, specimens measured nine inches in circumference.

No. 3, yellow flesh, free stone, large, ripe ten days before Smock, good shipper. Growers in this vicinity are so favourably impressed with these seedlings that they intend

to propagate largely, more especially as they have no trace of the yellows; they are anxious to keep clear of the dread enemy.

Mr. W. C. Searle, of Clinton, has a deep yellow flesh seedling peach, hardy, fine grower. He is strongly in favour of growing none but good seedlings. He thinks the peach grafted on plum stock is best.

Mr. Gage J. Miller, of Virgil, has a seedling peach, free stone, yellow flesh, early high colour, in form resembling Early Crawford.

Mr. R. Currie, of Niagara, has a large white fleshed seedling peach, melting, but not high flavoured, resembling Late Crawford in form, comes in after Early Crawford; free stone.

Drury Seedling.—This is one of the finest peaches we have met with among the seedlings, and one that can hardly be excelled among our many well-known sorts. It is grown by Mr. C. Gamon, of Collingwood, from whom we obtained its history. Coming across from Niagara some six years ago Mr. Gamon bought a basket of fine peaches and planted five stones from these; two grew, and the Drury seedling is one of these. The tree is planted in a southern aspect, well protected from the north by a house. It has proved entirely hardy, although last year it appeared to be weakened by cutting out of season too many scions from it. The fruit, which averages larger than the Early Crawford, ripens about 14th September; high coloured, yellow flesh, free stone, rich, a splendid shipper and abundant regular bearer, tree a strong grower. The other tree has not yet borne fruit, but appears hardy. Mr. Gamon believes the only method by which peaches can be grown successfully in the colder sections of Ontario is by planting the stones and keeping the best seedlings thus produced. Many fruit growers in the Collingwood section and through Simcoe county, encouraged by Mr. Gamon's success, are trying to grow seedlings, and already we have heard of a number who will likely be able to report fruit another year. Collingwood is the farthest north point we have heard of peach growing in, and it will be interesting to prosecute our enquiries another season, and find the results of a more extended trial in that far north district. Mr. Gamon took first prize last year at the Provincial Exhibition at London with the Drury seedling.

Mr. Joseph Walker, of Virgil, has a white flesh, free stone, juicy, pleasant flavoured seedling, resembling Morris' white; it is scarlet at stone.

Early Louise is spoken well of at Arkona, Windsor, and Goderich; hardy, free grower, and fruit always saleable in market.

Wager has been fruited in Lambton, and is said to resemble Early Crawford, but comes in later. Two growers think it is the same as the Allen.

Stump the World comes in about first October; free stone, large, white flesh, juicy, good. In Oxford said to be too tender. Does not gain in esteem in Huron. Rather too late to be valuable for Niagara district.

Mr. Thomas Holloway, of Clinton, has a peach taken from the garden of the Earl of Fortesque, Devonshire, England. It is one of the strongest growers we have seen, yellow flesh, large, early, hardy. A seedling from this also is making a very strong growth; fine healthy, clean wood. We hope to give a royal report on these another season.

Allen fruited at St. Catharines the past season. It is nearly as large as Early Crawford, and ripens between that and Late Crawford; a good cropper and considered valuable.

Mr. J. K. Gordon, of Whitby, has a fine seedling, yellow flesh, free stone, large, round, and a good shipper, very small stone, bright red cheek, ripens about same time as Early Crawford, tree inclined to grow low with spreading top, seems perfectly hardy. Mr. Gordon has several other seedlings, which appear to be hardy and thrifty. By protecting from the cold north winds and the scorching sun of early spring Mr. Gordon has succeeded in fruiting several varieties of peaches that hitherto have been considered too tender for this section.

Beatrice is losing in favour among a large majority of growers on account of its

small size. When the peach crop is large Beatrice could scarcely get a bid in the market.

Briggs' Red May originated in California, about same size and quality as the Alexander, but said to be less liable to rot, and will ship some better; is being tested in several points on the lakes.

Early Rivers, although thin skinned and fine grained, is esteemed as one of the best early peaches; ripens about the middle of August—in some sections a little earlier.

Morris' White is a favourite with many growers, and some intend to plant more of it, considering it is one of the most valuable of its season for market.

Wheatland, a chance seedling, fruit large, resembling the Late Crawford in form, yellow flesh, free stone. Said to be too tender excepting for a few favoured peach growing localities.

Mr. George Cox, of Goderich township, finds nothing better for profit than his seedlings Nos. 1, 2, 3, and 4.

PLUMS.

Col. John McGill, of Oshawa, has the following seedlings of promise, culled from a large collection:—

No. 1, large, round, purple, ripens ten or eleven days before Lombard, very productive and of good quality for market, a good shipper.

No. 2 resembles Yellow-Egg in size, colour and shape, but sweeter; tree thrifty and rapid grower and good bearer.

Seedling Plum No. 1, grown by R. J. Doyle, of Owen Sound, very large, egg shaped, slightly flattened at ends, a rich purple covered with light blue bloom. It is larger than Yellow-Egg, cling stone, very rich and juicy, annual bearer, vigorous grower in clay soil, but does not appear to do well in light soil, one of the earliest to ripen; wood brittle, so that when the tree has a crop of fruit it must be carefully propped; leaf long, smooth and glossy green. This is the most valuable out of a large list of seedlings tested some fifteen years ago in that section.

Moore's Arctic fruited the past season in the grounds of Leslie & Son, of the Toronto Nurseries. It is an immense cropper, regular bearer, and from the fact that it thrives well and bears abundantly at Dominion City, Manitoba, we feel justified in pronouncing it a thorough ironclad. The puncture of the curculio was seen frequently in the fruit the past season, but it did not appear to have any effect. Possibly the vitality of the plum is such as to overcome any effect the curculio might otherwise have, for certainly in no case have we seen any evidence that the egg hatched. Further experiment will satisfy us better on this point. In quality this plum is second class, but this is sufficiently good to warrant its high market value for the colder sections of this Province. Good shipper.

Seedling Plum No. 2, grown by R. J. Doyle, of Owen Sound, medium size, round, both size and shape resembling Reine Claude De Bavay, light yellow or straw colour with white bloom, juicy and sweet. The earliest plum in this section, ripening fully two days before No. 1. It is a good annual bearer, tree a dwarfish grower, round thick head, fine wood resembling willow, leaf long and rough. It seems to thrive well on a light soil.

Among seedlings grown in the vicinity of Owen Sound we find some very promising specimens; nearly all are prolific, and a majority would bring top prices in market. Among some of the finest we observed a blue as large as Smith's Orleans, somewhat resembling Quackenboss in form, pleasant, slightly tart flavour; stone splits when fully ripe.

Another seedling about the size and form of Bingham, coloured like peach, a shy

bearer, but bears every year and comes into bearing early; tart, strong fruity flavour, good.

Another seedling, green, nearly the form and size of Green Gage; prolific, free stone, flavour rich with slight tart taste, desirable for preserving, good to very good. This one is said to come true from seed.

Mr. W. C. Searle, of Clinton, has a blue seedling, small, inclined to be dry, acid; large cropper, of the Damson family, suitable for preserving.

Hudson Gage, esteemed at Kingston for preserving; tree bears well and regularly, and the fruit always commands the top price in market.

Imperial Ottoman.—Mr. Noah Sunley, of Guelph, who has experimented so much with plums, would plant this variety for profit. It is hardy, a prolific bearer, ripens about first of August, fruit medium size, light green, covered with light bloom, tree an erect grower, fruit has a suture on one side from the stalk half way down.

Monroe Egg, esteemed by Mr. Sunley for canning, tree hardy and a good grower, good bearer, fruit medium size, yellow, ripens about 20th Sept.

Prince of Wales, a purple plum, of medium quality and generally a very light cropper, tree rather slow grower.

Belgian Purple, Mr. Sunley says is a better cropper than Lombard and more generally hardy, as fine fruit and it bears young; short jointed wood, and is not as liable to black knot as many other varieties.

Marquis of Gransby is a first quality plum, bears large crops, light purple in colour, with red cheek.

Brahy's Green Gage is a large late green plum of first quality, medium bearer, and considered one of the best dessert plums in the city market.

The last named three varieties have been fruited at Guelph with the results as noted.

Autumn Gage, tree strong grower, spreading top, fruit medium size, yellow, covered with white bloom. Promises well at Guelph and in Essex and Huron.

Kirke's, a medium grower, hardy, fruit medium size, dark purple, dotted with yellow, covered with a heavy blue bloom, ripe about first September. Promises well in Guelph and Huron.

Black Diamond is grown at Guelph and near Windsor, and is said to be a good grower and hardy. Only a cooker.

Prince Englebert, tree a fine healthy, rapid grower, and a great bearer; deep purple fruit covered with brown dots, quality good, a very good preserving plum and valuable for dessert. It is grown and fruited regularly near Goderich, and being introduced at Guelph and around Hamilton and Brantford.

Pershore is being grown at Guelph and will be fruited next season likely. It grows well and promises fairly well.

Penobscot, reported from Glengarry as a strong, hardy grower and regular bearer, fruit large yellow with slight colouring in cheek, a good market variety, ripens about first September.

Glass's Seedling is reported from nearly all sections as a good grower and hardy, but in some sections it has not proved a heavy cropper. In the Guelph district it has not given a large crop yet. Nearly all unite in saying that it is a desirable variety. At Ottawa it blossomed two years; the first year it proved abortive, but the past season it gave a fair crop of fine fruit. One grower had finer specimens than he had seen anywhere in Ontario. The tree stands the climate well, and if the fruit spurs are able to resist the cold it will be an acquisition of the first importance in this section. One grower thinks so highly of it that he will largely propagate from it. In Huron it is one of the best in general good points.

Greenfield, about the size of an average Lombard, yellow covered with bright crimson, suture shallow, form roundish oval, stalk about an inch long, slender, set in a narrow cavity, flesh yellow, coarse grained, juicy with a tinge of acid, free stone, a splendid cooker. This variety maintains its character for hardiness and its wonderful ability to bear heavy crops regularly, every twig and branch being fairly loaded down. It has proved quite hardy, so that we have little doubt but it will thrive well in all the eastern counties, and we believe it may be found suited to the soil and climate of Muskoka.

Goderich fruits regularly, holds its reputation as the finest plum in that section. The old tree has never shown any signs of black knot; is a strong, clean, rapid grower, with very large strong foliage.

Seedling, a small, yellow seedling at Owen Sound, about the size of the black Damson, is esteemed for cooking. The tree has a low branching head and small fine foliage, resembling that of the common wild willow.

PEARS.

Col. John McGill, of Oshawa, has the following seedlings:—

No. 1, medium size, tree hardy and a good grower, has been bearing regularly for twenty-five years, and has never shewn any inclination to blight, quality good.

No. 2, a seedling from Flemish Beauty, and resembling that variety closely in size and shape as well as in colour.

No. 3, resembling the Glout Morceau in shape, size and colour; October.

Clapp's Favourite is doing well in Ontario county. In Middlesex and Kent it has done much to encourage a taste for pear growing. Those who used to contend that it took a lifetime to get a pear tree into fruit are now loud in praises for this variety, which comes into bearing early. Fruit spots and cracks badly in some sections in cold stiff soil, but in lighter loams and where land is well drained it gives fine clean fruit. Very well suited to soil and climate of Frontenac. At Galt is placed next to Flemish Beauty for hardiness, and when fruit picked early will keep better. Called one of the best in Paisley in Bruce county, and two Perth growers would rather part with any other two varities they have than this. One grower at Whitby calls it decidedly tender, and adds that it succeeds better as a dwarf. In Lambton three growers call it the next best to Bartlett, and one grower would not plant it as he cannot get it in good condition. At Ingersoll it has given satisfaction. Has done well in Simcoe and Grey, and fair in Brant. Succeeds well in Hamilton.

General Totleben, a good hardy heavy bearer, and long keeper in York. Only good for cooking in Middlesex. Does not seem to mature properly in Haldimand.

Mr. Gage Miller, of Virgil, has a seedling pear strongly resembling Louise Bonne de Jersey in size, form and colour, winter, tree a rank grower and heavy bearer.

Mr. P. C. Dempsey has a seedling winter pear of best quality; tree regular heavy bearer and strong grower; fruit medium size, resembling Lawrence in form.

The same grower has a seedling from White Doyenne crossed with Josephine de Malines, melting and luscious, size and form resembling Dearborn seedling, quality almost equal to Seckel.

Mr. D. Shoff, of McGillivray, has about sixty seedling pear trees, some of which he will test as seedlings, while upon others he intends to experiment; he buds the top, allowing the trunk wood to grow, believing that it will prove hardier against blight than a graft would. We will have the benefit of these experiments another season.

Souvenir du Congres of no value for general cultivation, being too tender excepting for a few favoured positions in warm soils. Through the Niagara district and along the

shores of Erie and Huron it thrives fairly well. One reliable grower in York reports a sample measuring one foot in circumference ; he says this variety is not sweet enough to be valuable.

Rutter.—One Welland grower calls this one of the best October pears. Has not fruited in Essex, but grows well. Grows and fruits well at Paris.

President Druard is being tried in Essex and has grown well, seems hardy enough.

Doyenne du Comice is grown in Prince Edward County, quality good, seems a desirable pear for October, and we would like to see it tested in other sections.

Sugar Pear, a seedling grown in Essex, and locally known as the sugar pear ; it is of medium size, roundish oblate, yellow, slightly russet with carmine cheek, flesh a rich yellow, tender, juicy, rich ; ripens last of August.

Mr. J. D Lutz, of Stony Creek, has a seedling pear, winter or late fall, will average about as large as Duchess, and partakes partly of the form of that pear, and partly that of Flemish Beauty, deep eye, small straight stem set in a basin of irregular form, spotted russet all over—good.

Mr. Joseph Walker, of Virgil, winter seedling pear resembling Louise Bonne de Jersey in form ; long medium size stem set on a corrugated surface, crisp, but rather inclined to be dry.

Mr. Thos. Mills, of White Oak, small light green fall pear, long thick stem, juicy, pleasant, good.

Beamish originated at Cataraqui, near Kingston, said to be very hardy, thrifty grower, good bearer, and held locally in high estimation for good quality.

Goodale, highly esteemed in Essex, some growers place it at the head of the list. In Frontenac it has not fruited, but is hearty and vigorous. In Niagara, Huron, and Lambton it gives much satisfaction. In Brant highly esteemed. This variety was sent out by this Association.

Toronto Belle.—We tested the fruit late in December and found it in grand condition ; in quality it is equal to Beurre Bosc, and almost identical in form and colour. The tree is a slow grower, but a heavy and regular bearer. This is without doubt the finest winter pear we know of, opening, as it does, a new era in the quality of winter pears.

Flemish Beauty is planted more generally in Frontenac and several eastern counties than any other variety, it proves hardy and a good bearer, fruit clean and free from spots, brings high prices on all local markets. At Toronto it spots and cracks so badly that it is hard to get good samples. A fine healthy tree, rapid grower and heavy regular bearer in Huron. Does well in Bruce and Grey. The best, only for liability to blight, says a Perth grower. Always reliable, says a Waterloo authority. Only for this variety my pear orchard would not pay for the care bestowed upon it, says a Brant grower. My Flemish Beauties always bring the top price at St. Mary's, says a Perth grower. What a pity it is so subject to blight seems to be the almost universal wail. This variety was sent out by the Fruit Growers' Association.

APPLES.

Col. John McGill, of Oshawa, has the following seedling apples :

No. 1, a small russet resembling the Pomme Gris in size and shape, but of a bright cinnamon colour ; tree thrifty good grower and heavy bearer, fruit keeps well, and in good eating season from May to June, quality good.

No. 2, large green, medium quality, December to February, tree hardy and good grower.

No. 3, a large russet with blushed cheek on sunny side ; tree good grower, very productive, January to March.

No. 4, medium sized russet on a green surface, very productive, strong grower, May to July.

Ontario has done well so far in Ontario County, some instances of fruiting there. In Huron it has fruited in several instances, and we find no dead trees in any of the western counties, but on the contrary the general report is highly satisfactory. Does not seem to make wood as rapidly at Kingston as elsewhere, but it appears hardy. At Ottawa it killed to the ground last winter, while in a couple of instances in Russel County it has not been injured, although its growth is slow. In Oxford, Elgin, Middlesex and Kent we have several reports of its fruiting satisfactorily. Sufficient has been the evidence to prove it early, as a bearer, which is important and doubtless the chief object of the cross at first.

Princess Louise, a seedling from Fameuse, grown by Mr. C. E. Wolverton, of Grimsby; it is fully as handsome and showy as that famous variety, and it has not yet shown any disposition to spot, besides it is a much longer keeper and as good in quality. This apple was named at the winter meeting of the Association in Hamilton some three years ago, when it was examined and considered of more than ordinary value. If it continues free from spotting it might well take the place of Fameuse, which spots badly all over Ontario.

Mr. John McLean, of Owen Sound, has a seedling summer apple, white ground with flushed cheek, round, close eye, white flesh, sprightly, sub-acid, fair.

Mr. J. B. Walker, of Grimsby, seedling apple, green flesh, russet, deep eye, ribbed, medium size, flavour medium, winter.

Prenyea, from Prince Edward County, esteemed in local markets as a late fall dessert apple, sweet, lacks character to entitle it to more general cultivation.

Mr. J. Adair, of Lambeth, has a tart fall seedling resembling Jeffries in size and form, but inferior in quality.

Beauty (Arnold's), has suffered slightly by winter killing at Ottawa, but has not suffered much in other eastern sections. Is liked in Halton by three growers.

Alexander Robertson, of Verulum township, Victoria, has a seedling apple about size of Snow, marked about stem like Swaar, ribbed, corrugated about eye, flavour good, sprightly, juicy, colour green, with slight blush, winter.

Whitney Crab, No. 20, fruited in the Toronto Nurseries the past season, about shape and nearly the size of Wagner, striped, flesh yellowish, crisp, good table apple for cold sections, a good cooker and preserver. For the North-West and Muskoka sections we fancy this apple may be a great acquisition.

Mr. Wiggington, of Goderich Township, has a seedling fall apple, medium size, yellow with bright crimson surface extending well over, fine grain, white flesh, oblong, small stem, close eye, flavour partakes a good deal of Famuese, sprightly, good.

Mrs. Saunders, of Owen Sound, has a seedling apple, yellow ground with flushed cheek, deep open eye, flattened and somewhat resembling Maiden's Blush; tree, an upright even grower, fruit of even medium size, will keep till March, and a fine shipper; quality fair to good.

Mr. Wm. Brown, of Owen Sound, has a seedling russet strongly resembling the Rox. Russet in size, form and quality, close eye, deep, smooth, small core, a good keeper and fine shipper.

Mr. Brown has another seedling resembling Grimes' Golden, which evidently keeps well, as specimens of the crop of 1880 were in fair condition last August, although the flavour and general character could not be discovered.

Hastings.—A local apple, hardy and suitable to cold districts. Esteemed in Hastings County, said to be a fine shipper; productive.

Haas is considered one of the best in the Whitby district for profit. At Galt it is one of the best three for hardiness. Has fruited at Cornwall and gives promise of

being one of the best for that section. Considered a good cooker and handsome at Hamilton.

Perry Russet is reported as a good grower, and seems quite hardy in Essex. Considered of little value in Oxford, compared with the other russets, which all keep better.

Walbridge is reported from one grower in Essex, as having been planted largely in that county, but he does not think it will prove a strong grower. Good grower at Hamilton.

Utter's Red is being grown in Essex, but has not borne yet. It is a western apple, but not likely to prove better than many already grown covering same season, November and December.

Wealthy is referred to favourably from several growers in Russell, Carleton and Glengarry as hardy and valuable. A fine, strong grower in Haldimand.

Ben Davis is gaining in popularity, finding its way very generally through the Province; is looked upon as very hardy, and fine shipper for British markets.

Grimes' Golden is highly spoken of in Essex and parts of Middlesex, also in Huron. Major Murray, of Clinton, thinks this one of the best apples on the list, both in flavour and for the dessert table. Vigorous grower and good bearer in Frontenac and Carleton. Several growers in Brant and Norfolk say it is valuable, and must continue to grow in popularity for dessert.

Tetofsky does not altogether hold its own in popular favour, owing mostly to the fact, as reported from almost every point where it is grown, that it drops its fruit badly before maturing. At Arkona it was ripe August 8th. Called a slow grower at Whitby and Walkerton. Too small for its season in Norfolk. Does best in heavy soils.

Ella (Arnold's), is doing well in Northumberland, Russell, and at Ottawa, although in some instances it has been affected by the frost of last winter. Only a medium grower.

Seedling Apple grown near Kingsville, yellow, covered with bright red, conical; flesh yellow, firm, tender, juicy, crisp, with a sweetish sub-acid flavour; rather under medium size; keeps till July when it commands a high price in local markets.

Mr. D. B. Hoover, of Almira, has the following seedlings:

No. 1, medium size, summer, striped with red, flavour slightly acid; good.

No. 2, medium size, late fall, yellow, with spots of russet and sometimes blushed cheek, keeps till the new year, flavour mild and pleasant.

No. 3, rather under medium size, winter, a fine bright red, white flesh, crisp, juicy, sub-acid, and a fine keeper.

Hoover's Favourite, supposed to be a seedling, large, pale yellow with red cheek, juicy, white flesh, slightly acid, abundant bearer, hardy, good to very good, good keeper and would ship well, a first-class winter fruit.

Mann is gaining in popularity, where it has been brought up, for foreign shipping. In the vicinity of Arkona it is held in estimation for its good shipping qualities, as well as being a good keeper. Is reported from seven western counties as likely to take the place of R. I. Greening. Is growing in favour in British markets. Some complain that it drops badly from the tree.

Smith's Cider is grown at Arkona, and considered an acquisition.

Dora (Arnold's), killed to the ground at Ottawa last winter.

Lord Suffield at Cherrydale Farm in Huron, is a splendid cooking fruit, tree hardy and a good bearer.

Grand Sultan, a foreign variety, large, conical, almost white ground with streaks of red, flesh white, crisp, juicy, sub-acid, medium quality. A large cropper and free growing tree, ripens about 10th August. It does not appear to be grown excepting in Prince Edward County and Huron.

Grand Duke Constantine, a foreign variety about same form as Grand Sultan, richly

striped and splashed with red on a straw coloured ground, and covered with gray dots, flesh white, juicy, sub-acid, pleasant. Grown in Prince Edward County.

Taylor Fish, at Cherrydale Farm, in Huron, is considered the best large fall apple grown there ; it clings well to the tree, and is considered the best for cooking in any shape. It is a regular, heavy cropper, and the tree a strong grower and hardy.

Baxter's Red, which originated in the vicinity of Brockville, is esteemed for hardiness and productiveness. It is being planted in Renfrew, and likely to prove valuable as a local fruit.

Mr. W. W. Austin, of Oxford, should propagate from his fine russet, which proves a fine grower and large cropper. It is certainly the handsomest russet on the lists, and one that would strike the fancy of consumers in Britain for the dessert table. In flavour and keeping it is fully as good as the American Golden Russet, and much handsomer in form.

An apple grown near Fonthill, and brought to the notice of this Committee by Mr. E. Morris, supposed to be a seedling. He says the tree is an upright medium grower. Fruit, green, covered with russet spots, about size and shape of a Rox. Russet, flavour slightly sub-acid, somewhat peculiar, but pleasant and juicy ; winter.

DISTRICT OF ALGOMA.

We have several reports from this district which may be of interest to fruit growers. Several of the first residents are enthusiastic horticulturists, and are determined to make a thorough test of the various fruits. Although they have year after year lost many trees by the severe winters they try again with a new lot of varieties, determined to find something that will grow and bear. One grower located on the north shore of the Georgian Bay, about forty miles east of Bruce Mines, says his first lot of trees were lost entirely, but he has another lot that are doing finely up to the present time. They have all ripened wood, and appear as if they will come through the winter safely. He finds it an advantage to nip off the tops of the new wood about the tenth of September, so as to secure perfect ripening of new wood on most varieties. The Alexander and Duchess appear to be perfectly hardy, and require no such precaution. Last winter was the severest known for many years, the mercury indicating 37° below zero. A great majority of the apple trees planted back of Bruce Mines were killed to the ground. There is a local seedling apple which has borne fruit regularly for six years on a farm exposed to the lake winds. The Glass Seedling plum is growing well on the farm of a Mr. Robertson back of the mines, and it is exposed to the severest lake storms. The same gentleman has a Clinton grape vine which is healthy and bearing large crops yearly. All over this section there are crab apple trees hardy and bearing regularly. Mr. W. Warnock, one of the most enthusiastic horticulturists in this section, has a large number of seedling apple trees which appear quite healthy. He intends to graft most of them next spring, and will be glad to try any cuttings of good and hardy kinds that fruit growers in more favoured latitudes may favour him with. There is a long list of wild fruits all over this district of more or less value, such as plums, cherries, raspberries, blueberries, cranberries, gooseberries, black currants and strawberries. Strawberries and blueberries are plentiful along bluffs, and wherever fires have burned off the timber. All along the coast large crops of cranberries are gathered every year on the marsh lands, those near the lake being always the best. Raspberries are a sure crop every year, and of much finer quality as well as much larger berry, than those found wild here.

Plums succeed well in the vicinity of Bruce Mines.

On the Manitoulin and St. Joseph Islands any of our hardy varieties of apples will grow and bear well, and are being tried pretty generally there in small lots. Early Amber Cane seed sowed on June 2nd, was nine feet high when the first frost came ; it was not ripe then, but by sowing earlier it can easily be ripened before the early frost.

Mr. Thomas McCullogh, of Korah township, near Sault Ste. Marie, has done considerable to encourage fruit growing in this section. He has a seedling from Fameuse

that has fruited the past six years; the fruit is medium size and of good quality, ripe in September, will keep well only about six weeks. He has also a number of seedling plums, but the fruit is little better than wild. The wild fruits in this section are plums, cherries, gooseberries, currants, raspberries, blackberries and cranberries. The blackberries ripens once in about six or seven years, gooseberries only bear every third year to amount to anything worth while. Black and red currants, raspberries and strawberries, bear well every year. The forest trees as a rule only bear seed once in three or four years. In 1879 a large number of fruit trees were planted in this section, but the winter of 1880 killed them all, and since then the settlers have been so discouraged that they are not inclined to make further test unless through the advice of the Fruit Growers' Association as to proper varieties. One gentleman tells us there is no use in attempting to grow anything in the Apple line excepting Siberian Crabs. But Mr. McCullogh has had stronger faith, and thus far, at least, fortune smiles upon him. Out of 200 apples, six pears, twenty plums, and two cherries planted, he only lost four trees last winter. As a rule, he believes the trees sent out there are too large. The trees he planted were one year old, and he believes they would have done better had he cut them back in the fall, as he thinks the first winter's trial with young trees is having too much wood above the snow line for the roots to support. He found a great many of them killed about a foot from the top. Last winter was exceptionally severe however, and it was preceded by a very wet fall, which, he claims accounts for the loss more than anything else. His experience is that when there is a very wet fall the sap is much weaker, and hence the trees are unable to stand an extreme frost. He says that in a wet year it takes 100 barrels of sap to produce as much sugar as sixty barrels will produce in a dry year. Through that entire section the first necessary step is to secure as dry a piece of land as possible, and thoroughly underdrain it before planting. Both forest and orchard trees suffer from sun scalding badly where the soil is wet, but this is rarely seen on dry spots. Three parties report a fair to good crop of Clinton grapes well ripened the past season.

In the district around Blind River and Bruce Mines the frost sets in about the last of September or first of October, and the late spring frosts is about the seventh of June. The soil generally through this section is a sandy loam. All along the Mississaga valley the soil is well suited to fruit growing. Along the valley the wild fruits are a sure crop every year, but the difficulty is to find a market for them. The Indians sell a large quantity of cranberries every year at about an average of five dollars per barrel, and there appears to be a good demand for all that can be grown. The sample is said to be much finer than any generally grown through the old settled portions of Ontario. Huckleberries and blueberries also find their way to the lake port towns and cities pretty freely. Along the river bottoms there are as fine cranberry lands as any one could desire, where the water advantages for flooding are perfect; and with very little capital large crops could be reaped every year. These wild cranberries are superior to the famous New Jersey and Wisconsin berries.

Signed on behalf of the Committee,

ALEX. D. ALLEN, *Chairmvn.*

STRAWBERRIES

MR. GOTT, in introducing a discussion on the question, "Which varieties of Strawberries are the most profitable for the market?" said this was a very difficult question to discuss, and a far more difficult question to settle. There are some good varieties, however; the old Wilson's Albany perhaps stands at the head of the list of good varieties—profitable varieties. Not to say that it is a variety of the highest quality, but it has the most money value in it. It is the best known of all the family of strawberries by the people of this country. They are thoroughly acquainted with it, and know how to grow it. The Crescent Seedling is apparently a new variety, but a variety of great promise. Its fruit is not so hard as that of Wilson's Albany. It is large, and the berries are pretty uniform in size, and readily command a market. The Cumberland Triumph is similar in most respects to the Crescent Seedling, and the New Dominion is one of the same class of

berries. Both are profitable. The Triumph de Gand and the Colonel Cheeny are old berries, but they are profitable. Two new strawberries, by Mr. Arnold, called his Pride and his Bright Ida, are also profitable. They are very fine fruit too. The Glendale and Bidwell are comparatively new, but what is known of them is very favourable. They are very fine in fruit and in flavour. The Sharpless is pretty well known. It is of large size, and is considered to have some good qualities. It is not a profitable variety for the market. The Kentucky is a good variety, coming later than the varieties I have mentioned. It is not a very heavy bearer, but with good cultivation it will pay abundantly for the trouble. It commands a good price in the market, being the last with us on the list. I think I have gone over the most profitable varieties that we are acquainted with.

MR. A. M. SMITH.—I do not grow many strawberries for market. I grow more for testing varieties and raising the plants. If you want my opinion on the different varieties, of course I am willing to give it. If you want the varieties that have paid best during the last year in our locality, as far as I know the first has been the Early Canada. It has been the most profitable of any that I have seen or heard reports from. The next two that I have fruited have been the New Dominion and the Sharpless. The Crescent Seedling has paid very well. I have a good many new varieties that I have just tested for one year. I have not grown them for market. Some of them are very promising. I have three or four varieties of our friend Arnold's, that as far as quantity is concerned, and as far as appearance goes—and that is what generally takes in the market—I should judge would be very profitable market berries for not very distant markets. The most of them are a little too soft for shipping long distances. I have lost the names of some of them. The most promising are what he calls Arnold's Pride and the Bright Ida. The Glendale would, I should judge, be quite profitable for a late strawberry. It ripens about the time of the Kentucky, and is a little improvement on that variety. If I were going to select about four varieties, I would select the Early Canada, one of Mr. Arnold's, the Dominion, and the Sharpless. For market they would stretch the season through.

MR. GOTT.—Which of Mr. Arnold's would you prefer?

MR. A. M. SMITH.—Arnold's Pride as far as I have tested it.

MR. HONSBERGER.—I am not a very extensive grower of strawberries; yet I have grown quite a number of varieties, and as I am compelled to grow them for profit I have dispensed with endeavouring to experiment, because I could not afford it. The earliest I had was the Herculean. That was a good berry if parties did not care much about size. It was a nice flavoured berry. Then came the Wilson's Albany, which was the standard with me until the past year. Then I grew the New Dominion and the Captain Jack, the Jucunda, the Triumph de Gand, which was a nice flavoured berry if not allowed to over-ripen, and the Kentucky. The Colonel Cheeny for a time grew very well with me, though not of late years. The New Dominion I grew very extensively, and found it to pay very well; but up to the last year I kept discarding one after another, and after picking my straw berry crop of last season I turned under the last of them but one. The last one I turned under was the Wilson's Albany. Now I have none but the Early Canada. Yet I would not propose for market to confine myself to that one variety. I would take the Early Canada, and the New Dominion for late. Those two I should confine myself to for profit. I have not fruited the Sharpless or Crescent Seedling, but I have seen them fruit to my perfect satisfaction.

MR. A. M. SMITH.—I was going to ask Mr. Honsberger the time of ripening of the Early Canada, as compared with the Wilson.

MR. HONSBERGER.—I planted them on the same ground and gave them the same treatment, and found that we picked the Early Canada at least six or seven days before the Wilson's Albany. My pickers were beginning to complain, thinking they were never going to get done picking it.

MR. DEMPSEY.—How many thousand quarts would it produce to the acre under good culture?

MR. HONSBERGER.—It depends a good deal on how far the rows are apart. I had just about an acre of ground planted with the Early Canada. I had the strawberries planted between peach and apple trees. I had something over four thousand quarts this year.

MR. WELLINGTON.—I grow all the different varieties, mostly for the plants. Of course we fruit them all, and have considerable fruit each year on our grounds. If I were going to plant them as an amatuer I would put down the Sharpless. The New Dominion I believe to be one of the best strawberries we have, as is also the Cumberland Triumph. I would cultivate the Monarch for my own use; but it is useless for the market on account of its not ripening or colouring at the point. To my taste it is good however. The Bidwell is another berry that I think will come into general favour. Of course it has not been thoroughly tested yet. The Crescent Seedling is an enormous cropper, but to my taste it is inferior in flavour, and of course not good for shipping. I suppose, for shipping purposes alone, or for productiveness, the old Wilson has not as yet been superseded.

MR. MORRIS.—One of the most profitable berries among the common varieties is, I think, Captain Jack. I believe it will outyield any of them; and it will ship quite as well as the Wilson, keeping its colour longer. The Wilson, the Captain Jack, and the Crescent, are, I think, the most profitable to grow for money. I have great faith in this New Dominion. I have given a very large order for plants of it.

A MEMBER.—I would like to ask any gentleman to say how Canada and the New Dominion are with regard to fertilizing.

MR. ARNOLD.—The New Dominion is quite perfect—needs no other variety with it. I cannot speak of the Early Canada.

MR. HONSBERGER.—I came to the conclusion that the Early Canada was very productive.

MR. ARNOLD.—I would say a word in favour of Mary Fletcher. If you have not cultivated the Mary Fletcher you do not, I was going to say, know what a good strawberry is. It is decidedly the best strawberry grown. This variety was sent to me from Nova Scotia. I had little faith in it at first; the climate did not seem to suit it, but for several years past it has been one of the finest growers we have. It bears a first-class crop; perhaps not equal to the Wilson sometimes, but no one would take the Wilson strawberry after tasting the Mary Fletcher, if they could get the Mary Fletcher. It is not very large, but it is delicious. The Sharpless has been a failure with me. One of the finest old varieties that I rember is the Nicanor. That is, for flavour, but it never looks ripe; it is always white on the tips, and you take it to market, and people will sometimes tell you it is not ripe. The old Hooker has also a fine flavour. I have raised several thousand seedlings, and even in my own family we did not agree with regard to them. My wife selected one as the best, one of my daughters selected another as the best, and I selected a third as the best. The Alpha, I believe to be one of the best when planted on sandy soil; and it is a good shipping berry. Maggie and Bright Ida are not such good shipping berries, but for the market they could not be beaten. The one I named after myself could not be beaten in flavour, though it has a peculiar flavour which some might not like.

MR. WOODWARD.—I have a friend in Hartford, Connecticut, who produces the most startling results with the Sharpless of any berry I know. He is a very good cultivator, and manures very highly. He has been producing two quarts to the vine. I have been doing the same in my garden, and they are getting on remarkably. I am manuring with bonedust and ashes. I have received a letter from this gentleman, and he says some of the berries have gone considerably over two quarts to the single vine during the season.

MR. BUCKE.—The two strawberries that we hear the most of in Ottawa are Mr. Arnold's 23—I believe it is called Arnold's Pride—and the New Dominion. Sharpless has done very fairly; but the berries are not uniform in size. Some people like it very well. I do not think it yields so good a crop with us as either Arnold's Pride or the New Dominion. I went to work, some years ago, when I commenced to grow strawberries, and manured them very heavily, and I found I got more leaves than berries. I put on barnyard manure.

MR. BEALL.—We grow nothing but Wilson's Albany. We cannot find anything else that will pay as well, and it is always a certain crop. It never fails with us.

MR. WILLARD.—When the New Dominion was first brought out Mr. Smith sent me some plants. I set them out and continued to cultivate them, and we like them very

much. I have also sent them out beyond the Mississippi. A gentleman who was on my ground and saw some of the fruit said if he could have such berries in Philadelphia he could get a fine price for them. He said that they were the finest berries he had seen. I think I have twenty-five different varieties growing there, and I do not know any better among them. Some strawberries seem better adapted for one kind of soil, and some for another.

Mr. Dempsey.—I have been cultivating strawberries for a few years, and I have tested quite a large number of varieties during the time. I have never, however, propagated plants for sale. My experience has been in obtaining the fruit, and in endeavouring to make the most money possible out of it. So far I have found the most profitable variety that I have cultivated has been the Crescent Seedling and Wilson's Albany, when we cultivated to any extent. The Crescent Seedling produced a very fine crop this year, and we took the last picking of it with the first picking of the Wilson's Albany. When I came to look over my receipts at the end of the season I found that not only had the Crescent Seedling been profitable, but that it had commanded in the market about fifty per cent. more than Wilson's Albany, taking the crop into consideration. They went into the market earlier, and consequently brought a higher price this year. Last year I did not discover so much difference in the two varieties. Captain Jack was very fine with us this year, and very prolific. This New Dominion I have been cultivating ever since the first year it was sent out, and I have never had one good crop off it in that time. I keep trying it on different soils, hoping I may strike a soil that is something like its native home. It was on the soil that I saw Mr. Biggar cultivating it that I got the most successful results from it. The Sharpless we failed to get any satisfaction from when we first planted it, because we were too anxious to get big strawberries. We placed it on land that was very strongly manured with stable manure, and the consequence was that we got leaves and not fruit. We planted it then on light land manured with ashes and bone dust, and that appears to produce berries and very little foliage. We had some land that was manured with stable manure, but did not have the bone dust and ashes; we also had land that was manured with the bone dust and ashes only, and while the average per acre on the one was 6,000 quarts of Wilson's Albany, upon the other it was only 2,000, with the same variety of berry and the same cultivation. I find that the difference in productiveness a great deal more than pays for the bone dust and ashes. They cost a great deal less than stable manure with us. This test was on two blocks of two acres each. We have several new varieties. In fact, about every new variety that we hear of we try. When we went to pick the first of Arnold's Pride that were ripe a person who was with me said, "Why, we can pick those berries with a scoop." The first time we picked them we took as many quarts from the block as we had set plants. They had been set two feet apart and had been allowed to have runners, and every two feet we found a quart of berries. How much was picked during the season it would be impossible for me to tell, from the fact that our experimental grounds are all open to the public, and everybody wants to take away some specimen berries to show their friends. I believe there is money in the Sharpless. Any strawberry that will pay to grow for market it will pay the amateur to grow. I believe there is money also in the Arnold's Pride, but I believe there is more money in the Crescent Seedling and in the Wilson's Albany than in any other. They ship in good order. I have found no difficulty in shipping the Crescent seedling to Montreal, so I would have no hesitation in shipping them on account of their being a little soft. I did not ship any of Arnold's Pride; I had none to ship.

Mr. Page submitted the Report of the Committee on Vegetables, as follows:—

VEGETABLES.

Your Committee to whom was assigned the duty of collecting information on vegetables submit the following as a result of their work:—

Under the name of vegetable comes a large number of valuable articles of food, and

to refer to all would be a herculean task. We may say, however, that we have given some thought and study to the general subject, and will present our considerations in as concise a manner as possible.

The past season was one of unusual heat and drought, both of which are much against the development of growth and quality in most kinds of vegetables. Potatoes, one of the leading vegetables, are a very short crop and the tubers small—this will apply to most sections of the Province—the hot, dry weather not only being against their growth, but the tops being thus slight and of slow growth were an easy prey to the bug, which in some of the eastern counties was much worse than ever before; while in the western sections of the Province, probably due to a more determined fight against their ravages, have not done as much harm as usual. The general method of destruction is by applying Paris Green mixed with plaster. The Committee of last year reported quite fully upon the many varieties; we shall therefore only refer to a few of the newest. Among the first of the new varieties stands the Beauty of Hebron, which for earliness, yield and quality is unsurpassed. The White Elephant and St. Patrick have, where tried, proved of good quality and productive. From reports gathered by the *Canadian Farmer*, we find the Early Rose and the Early Vermont to be leading early varieties, although the Rose in many sections is running out. From the same source we find the average yield last year to have been less than 100 bushels to the acre. Many fields scarcely returned the seed, while some were not dug at all. We recommend from the first to the middle of June as the best time to plant for general crop, while early potatoes should be in the ground as early as possible in the spring. Referring to some other leading vegetables, first :—

Asparagus.—This is but little grown except in certain sections, and not very good success has attended its cultivation in Ontario.

Beans, Early.—Newington Wonder and Black Butter are good. The Golden Wax is a decided improvement on the old kinds.

Beets.—The flat Egyptian commend themselves for earliness; they keep good till late in the season. Early Bassano and Blood Turnip are good in their season. It is difficult to obtain fine seed of the long Blood beet; they are the best for winter use. "I am using some now, growth of 1880, perfectly sound and fresh; they were kept in the cellar covered with dry sand." (John Croil.)

Leaf Beet or Swiss.—Is well worthy of cultivation. The leaves have all the flavour of spinach and is more easily raised. Vick in his catalogue says "the leaf stalks, cooked like asparagus, are considered by many, especially in Europe, a great luxury."

Mangold Wurtzel is not nearly so much grown as it should be. The same authority says of it: "In no way can so much good food be grown so cheaply for the cattle." We find Carter's Orange Globe a decided improvement on the old kinds.

Brocoli or Kale is of easy culture. In Scotland it is a favourite dish. But little grown.

Cabbage is a universal favourite, but, unfortunately, the cabbage worm has been so destructive as almost to prevent raising it. Of the many preventatives recommended none seem to be effective. The kinds generally planted are Winningstadt, Large, late Drumhead, Flat Dutch and St. Dennis. Henderson's Early Summer is good, but small; would class with the Winningstadt.

Carrot.—Long Orange and large red seem to be the favourite kinds; prefer the Early Shorthorn and the half long stump rooted for the table.

Cauliflower.—Very few seem to know the luxury of a good dish. We find the Early Dwarf Erfurt the most reliable.

Celery.—Sandringham, Golden Dwarf and White Solid are all good varieties. Difficult to grow on account of thrip.

Corn (Sweet).—Tom Thumb is small but good for an early crop. The New Egyptian is too late for climate: would recommend Moore's Early Concord and Stowell's Evergreen, *both excellent kinds* for late use.

Lettuce.—Victoria Cabbage and All the Year Round are good.

Melons.—I have had good success with what I call the Montreal Musk Melon, raised from seed. I saved from a fine specimen bought in that city many years ago. They have always ripened, are large, netted, and of excellent quality, flesh green. This year I tried the Bayview Melon; very highly recommended; planted ten days later than the Montreal Melon, it soon outstripped it, and when I left for Scotland, 1st July, the vines were most luxuriant, and there was fruit six to eight inches long, the others yet hardly showing fruit; a severe drouth seemed to damage both kinds. The Bayview ripened enough fruit to prove the quality good; it then dried up and failed. The Montreal kind recovered and yielded well. I watered neither kinds; perhaps they would both have been improved by liberal watering. (John Croil). The New Surprise is early and luscious, but too small for market. In water melons have found the Ice Cream good, and the Sculptured Seeded Japan an improvement on old kinds. The Cuban Queen is a new variety, very large and fine, sometimes reaching as high as eighty pounds in weight; vines very strong, healthy and vigorous, flesh bright red, solid, luscious, crisp and sugary, excellent keeper, good to ship to distant markets, rind thin.

Onions.—Top onions are largely grown. Good success has been attained with seed sown of the Large Red American and Yellow Danvers varieties, but consider Red Weathersfield the leading variety.

Rhubarb grows everywhere and thrives on any soil, but prefers a light rich bed. "I was much struck when in Scotland at the effect produced on two plants treated with liquid manure from the barnyard. The leaves were three feet long and about as broad, but the stalks were not in proportion." (John Croil.)

Spinach.—The Savoy leaved, a new variety, is an improvement.

Squash.—Early Crookneck, Hubbard and Vegetable Marrow, yield palatable dishes. The vines would yield more fruit if pinched off, and not allowed to run at such great length.

Tomatoes.—The Trophy, Hubbard's Curled Leaf and Hathaway's Excelsior are the best.

Turnips.—Little cultivated; the little black fly is a great enemy to them.

Summer Savoy, Sage and Wormwood are raised to some extent and with profit to the market gardener.

W. Pemberton Page.
A. W. Taylor.
John Croil.

Mr. Beadle.—I would say with regard to the cauliflower that when we have extreme heat and drought, that frequently prevail in our part of the Province, it is difficult to raise that vegetable. However, I have found that by sowing the seed late, keeping the plants in a cool, shady place on the north side of a fence or by a building, and planting them out the latter part of the summer when we may hope very soon to get copious rains, that they do much better. If the autumn is something like the autumn we have just passed through those plants will head pretty well; and if they have just commenced to "button" when the cold weather begins to come on I take them up and put them in my root-house and set them out again—something like it was described with regard to celery—putting some earth around the roots, moistening the roots enough to have the circulation continue in the plants; pack them closely together—about as close as they would stand—and they would develop in the root-house very fair sized heads—though not as large as if grown out of doors—and the flavour would be very fine.

Mr. Beall.—I would have liked if the chairman of the Committte had submitted something with reference to the profitableness of growing any of these vegetables. It strikes me that asparagus is an exceedingly profitable crop. I have a small bed three rows in width—about four feet and a half and about seventy feet long—and I get from seven to ten dollars from that bed every year in addition to all my family desire to use

in our house, and that is a great deal. And there is no expense connected with it after preparing the ground with it in the first place. In speaking of lettuce there was one kind not mentioned that I think should have been mentioned, that is, the French Cos lettuce. I know that people generally say they cannot make it head. I think a crop of onions can be carried on as profitably, perhaps more profitably, than a crop of any other kind of vegetable. I have a piece of land about seventy feet square off which I have now for the past seven years averaged nearly forty bushels. That would be at the rate of about 300 bushels to the acre. Now, there is no more expense in growing onions than there is in growing a good crop of potatoes. These generally average me about a dollar and a half a bushel. That is in the spring. The only difficulty would be in keeping them safe, and I find not the slightest difficulty in that. I have a building prepared partly on purpose for that. It is a loft over my tool-house. It has a good floor, and on it there is about ten wagon loads of dry dust—black muck from the swamp. I generally add a load to it every year. That gets intensely dry. I spread four or five inches of it on the floor on the first place, lay the onions to the depth of five or six inches, cover that up with dry dust again—the balance of it, and then put on some straw. About the first really cold snap that comes on I open the doors and let the onions freeze if they can. When I believe they are pretty well frozen I close everything up, and never open it again until the time I want to get the onions out, and I find they are in perfect condition apparently. Whether this treatment hurts them or not I do not know ; all I know is I can always sell them readily for a big price. I have grown onions for seven years in the same piece of ground, and I find the last crop as good as the first. Last year I got thirty-seven and a half bushels from that piece of ground.

A MEMBER.—What do you fertilize the ground with?

MR. BEALL.—With barnyard manure chiefly. I use ashes somewhat, and I use salt very largely. On that spot I generally use half a barrel of salt a year. My barnyard manure I produce in the spring of the year, and shortly afterwards I get a few loads of this same black muck put on to it, and that is turned over several times during the summer, and not applied on the ground until I am ready to trench up for the winter.

MR. PAGE.—In reference to asparagus, I was unable to get any data as to the profitableness of that article. I find there was very little of it grown except in very few places. My own experiences of it have not been very pleasing. I have raised onions to a considerable extent, and I find the ground is better adapted to onions the third, fourth, or fifth year than it is the first year, provided it is properly manured. Mr. Beall refers to using muck for onions. I tried that one year, and was very successful indeed with it. I mixed a little lime and ashes with it, and then the onions grew very large and thrifty, but when we came to use them they were so strong that we could scarcely use them at all. I do not know whether that was from the manure, or the muck, or what. The soil that I raised them on was a sandy soil, which I think is the best for raising onions.

MR. BUCKE.—Down our way it has been considered wrong to grow asparagus in beds unless you plant them a long way apart. The roots of the asparagus require plenty of room, and it would be better in rows than in beds. We used to grow cauliflowers down our way, but the cabbage insect has proved so bad that we had to give it up of late years. The most delicious vegetable, I believe, that is grown was not mentioned in Mr. Page's report, that is, the Lima bean.

MR. BEADLE.—Do you grow that at Ottawa?

MR. BUCKE.—Yes. We generally plant it on sods, either under a cold frame or on a hot bed, and then plant it in hills and grow it on poles. They do not come in until about September. When we plant them in sod we transplant the sod with them.

MR. BEALL.—We have no more tronble in growing the Lima bean than we have the Early China, but I can tell you a wrinkle about the matter. I learned it by negligence this last year. We like the old butter bean—that is, the tall one ; and we like the Lima bean better than any other of that class. Last year I had to neglect some portion of my garden. These beans were neglected among other things. They were neither of them ever poled. They just grew in a perfect mass on the ground near together ; and it was the best crop we ever had.

MR. TAYLOR.—We would not have the Lima bean in our garden. It is no profit to

us. We want to grow things in our garden to make a living out of. The cauliflower we cannot raise any more in our neighbourhood satisfactorily. I can remember the time in Hamilton when we got as high as half a dollar a head for it, but now I do not know that I sell two dollars worth of cauliflower in a year. It is eaten with the insects. As for onions, I have grown them successfully for twelve or thirteen years in the one place, but now I cannot grow them—not to any account. The maggot and the thrip have totally destroyed them. Then celery we used to raise, but we cannot do it any more.

MR. BEADLE.—What do the gardeners grow for a living?

MR. TAYLOR.—We raise a few things, and manage to raise a living. We raise potatoes, and we can raise a few cabbage by putting them in large fields. We can grow beets; I do not know that anything has attacked them yet. We grow carrots too, in large quantities.

MR. BEADLE.—You used to find asparagus profitable, didn't you?

MR. TAYLOR.—Yes; and it is now, where people have good places for it.

MR. ARNOLD.—Can you tell us whether there is more than one kind of asparagus?

MR. TAYLOR.—Yes; there are half-a-dozen kinds.

MR. ARNOLD.—Can you see the difference in them?

MR. TAYLOR.—Yes. We plant them in rows so that we can get through between them.

MR. BUCKE.—Have you tried putting salt on the ground for destroying the worm that eats the onions?

MR. TAYLOR.—Yes; we have tried salt, and we have tried ashes, and we cannot get rid of it.

MR. WILLARD.—In regard to the cabbage worm, I was very much interested last month at a statement made at the Michigan Horticultural Society on that subject. It was stated, as a fact, that the use of pyrethrum or Persian insect powder was positive destruction to the cabbage worm. It was said that two teaspoonfuls to two gallons of water applied to the plants with a syringe—frequent applications to it—was perfectly effective. The question was brought up whether it would be safe to use London purple or Paris green for it, and the gentleman said it would not. He mentioned this as a remedy that was not dangerous to use. He said it was not poisonous. He stated that they had used it at the Agricultural College at Lansing with great effect.

On motion of Mr. Beadle, seconded by Mr. Honsberger, committees were appointed as follows:—

On New Fruits.—Messrs. Morris, Allan, Gott, Gilchrist and H. Young.

On Ornamental Trees, Shrubs and Plants.—Messrs. Wellington and Leslie.

On Vegetables.—Messrs. Bucke, Page and Taylor.

On Roses.—Messrs. Beall, Wellington and Dempsey.

With instructions to report to next winter meeting.

THE CHESTNUT.

"Is the Sweet Chestnut a profitable tree to cultivate for the nuts?" was the next topic brought forward for consideration.

MR. BEADLE.—The price of chestnuts has been going up in our part of the world right along this four or five years. It is a favoured part of the country too for chestnuts. A large part of the County of Lincoln is just chestnut land, and I can remember when it was largely covered with chestnut trees. But they have gone before the woodman's axe, very many of them, and the price of chestnuts this year was about four dollars a bushel from the farmer's hands. I can remember when we used to get them for about half that —only a very few years ago too. I do not know whether a chestnut tree yields one bushel, or five, or ten. There is another thing about the chestnut trees. Well, these things go by fashion, so I suppose we cannot always rely upon them, but for a while the chestnut tree has been a very fashionable tree for finishing the inside of houses—for win-

dows, doors, etc. It is used also for furniture. I think the price of good chestnut lumber has been about $25 a thousand.

MR. BUCKE.—I have been trying to grow chestnuts in Ottawa for a number of years, but instead of the trees growing up they are going up all the time. I cannot grow them there ; it is too cold for them. It is a very pretty tree, and I wanted to grow it for an ornamental tree. The wood is highly ornamental for furniture.

MR. ARNOLD.—I would say chestnut trees were profitable where they would succeed. I know a fair-sized tree will yield a good many bushels of nuts. We can scarcely grow chestnuts in my section of the country. They cannot be grown north of the Grand Trunk Railway. They grow a few miles south of me.

MR. PAGE.—I have lived in the chestnut country all my life, in the County of Welland. The trees grow very freely. I have seen in cutting down forests abounding in chestnut trees, that where we would cut down one chestnut tree five or six more would grow up around it. I have cut all these down to one stock and let that grow, but I have never been able to get many nuts off that tree in ten years. A chestnut tree will hardly bear short of fifteen years. I have seen chestnut trees bear from four to six bushels of chestnuts, but it takes a pretty large tree to do that. With us it is one of the most valuable timbers we have.

MR. GOTT.—In answer to this question I would say "yes." The tree is an ornament to any country. Its fruit is very respectable, and always commands respect. It will bring in our market about $4 per bushel. The young trees will usually commence to bear in favourable locations at the age of from seven to ten years, and go on increasing more and more until they attain their full size. The timber is valuable for a variety of purposes, both indoors and out.

MR. HONSBERGER.—I would say as to the nut-bearing qualities of the tree "no," but as to the timber qualities "yes." Although the nuts are very acceptable to people generally, yet they are very indigestible, and consequently useless, in my estimation, as food. I was brought up in a chestnut country, and gathered many a bushel of the nuts, but for the last three or four years I do not think I have eaten that many chestnuts, because I find them very injurious to me as food. But I prize the lumber very highly as being equal, if not superior, to the black walnut. I think that for the timber it would be very profitable to grow.

ROADSIDE TREES.

The next topic was "What are the best trees for country roadside planting ?"

MR. BEADLE.—I would suggest that one of the prettiest trees for country roadside planting is the rock elm. Of course the roads must not be too narrow where those trees are planted, or the trees be planted too thickly, because they will shade quite a space. I would also mention besides that our own white ash. If the trees should happen to be planted too thickly, so that it will be necessary to take some of them out, the wood will be worth all that the trees have cost.

MR. BUCKE.—I would suggest the black walnut, providing it is planted in great number, so that the boys shall not break them all down to get the nuts ; also the maple. In fact, excepting the soft wood trees, I do not know of any tree that would not be suitable for a roadside tree.

MR. HONSBERGER.—I like for a country roadside tree the Norway spruce, and then between them, at a nice distance for a walk, plant the soft maple.

MR BUCKE.—I think the Norway spruce would be apt to make drifts in the winter time, if there should be much snow.

MR. HONSBERGER.—A person would naturally think so, but I can say that I am very fortunately disappointed in that myself. I have planted them by the roadside, both running north and south, and running east and west, and they are not liable to cause the snow to drift.

MR. DRURY.—We plant maples in our part, on account of their assuming such a beautiful shape in a few years. We also plant the spruce and the white pine.

MR. BUCKE.—The great trouble in planting roadside trees is the cattle. Until we can get some law passed to prevent cattle running at large, it is difficult to prevent the cattle rubbing them down. I look upon the subject of tree planting as depending entirely on the cattle question.

MR. DEMPSEY.—I fully endorse what the secretary says respecting the elm. In some of the Eastern States they use the elm, and they are certainly all that we need desire for a roadside tree. I have seen the white bark birch planted on the roadsides. It certainly is a very pretty tree—attains a very graceful and beautiful form, and I think it is much prettier than the maple, particularly the hard maple. The soft maple makes a rapid growth, and it is a very pretty tree for the roadside. Where the black walnut grows alone it appears to attain too much of a spreading habit. I presume it could be trimmed up. Speaking of the elm again, I believe that on the front of Sidney, in the County of Hastings, they have one shade tree in a distance of about twelve miles. They deserve thanks for leaving that. That elm spreads farther than the width of the room, and I have driven under it frequently when I have been out on that road in the summer—it is a very hot road—and I have enjoyed a rest there very much. And I presume my horse has enjoyed it more than I have. Any one who has ever stopped to rest in the shade of a tree like that can certainly appreciate the value of the elm.

MR. DRURY.—There is no doubt that in the absence of a stock law in this country the planting of trees on the roadside will be very rare indeed. As a matter of fact, if one municipality takes a stand against cattle running at large, the adjoining municipality may not take the same view of it. And in that way the measure of the first municipality may be rendered abortive. In our part of the country we have a few very nice drives, that have been made by a little care in the clearing up, by parties taking the trouble to throw the brush back and leave the trees in a line. Speaking of the country as a whole, it is almost impossible to say what tree is the best for roadside planting. I think we must first have a stock law, and then I believe there will be a desire on the part of municipalities, as well as on the part of individuals, to beautify our roads by planting trees.

MR. PAGE.—I prefer for the roadside either elm or maple; but, as has been said by former speakers, it is useless to talk about planting shade trees on the roadside while the cattle are running at large.

MR. GOTT.—There are three or four kinds of maple that are very valuable. The only objection to planting it is that the roots spread so far in the soil. But it is a very beautiful tree. Our basswood tree for roadside planting is not only ornamental but useful. The chestnut tree would also make a very beautiful shade tree. It is both useful and ornamental likewise. So also is the hickory. The Lombardy poplar and the ironwood tree are beautiful trees for our roadsides.

GENERAL DISCUSSION ON TREES.

MR BEADLE.—With regard to trees for towns and cities, the best growing tree, and the one which has been the most popular on that account, is the silver-leafed maple. It is sometimes called the soft maple, but there are other soft maples. The botanical name is *Acer dasycarpum*. It grows so fast that sometimes the branches split during high winds, and I have found it necessary to take the saw or the pruning knife to the trees and head them back so as to make them grow more compactly. If this were not such a fast age, and we were not in such a hurry to have shade trees, I would prefer the sugar maple. It is a more cleanly tree, if possible, than the silver maple. It does not sprawl so much; it has a brighter and closer foliage, and, I think, is more symmetrical and beautiful to the eye. If you ask me what tree I would take next to that I get puzzled. There are several trees. There is a tree that we call the ash-leafed maple. It is not a maple; it is not an ash. Botanists have put it under the head of *Negundo aceroides*. It is a hardy tree—I suppose a more hardy tree than the sugar maple. It will grow as far north as

any tree can grow. It does not make as large a tree as the sugar maple. It makes a very pretty medium-sized tree with a rather compact head and pinnate leaves. The prettiest native evergreen for ornamental planting is what is commonly called the hemlock, but it needs to be planted with some care. It needs nurses. If you take one hemlock tree in any part of the country and set it out on the lawn by itself, ten to one but it will die out; but if you will plant a little group of trees—a hemlock to each three or four Norway spruces—and let them grow together, and gradually cut out your Norway spruces so as to have a clump entirely of hemlock, after a while you will have one of the most graceful groups of the prettiest of all the evergreen tribe. Our balsam fir, while it is young, makes a pretty ornamental tree, but when it gets to be twenty-five or thirty years old it loses its lower branches and ceases to be an object of beauty. Our white spruce would be my choice in preference to the balsam fir. I think it will hold its limbs pretty well. It certainly will hold its limbs at the ground much longer than the native balsam. The Weymouth pine—our common pine—is a beautiful thing; but you ought not to plant it on small lawns. It is a beautiful tree planted alone, and allowed to have free scope to develope itself. Will it pay to plant the black walnut for commercial purposes? I suppose there are none of us who can speak from experience. If a man has a piece of land that is suitable for the black walnut and not so very suitable for tillage purposes, being broken and uneven, I believe that it will pay a person well who will take care of a plantation of that sort for twenty-five years. The wood, as we all know, commands a very high price in the market for the sake of the lumber it makes. It is continually growing scarcer, and the price is going up. I can see no reason why a plantation of that kind well taken care of should not pay well. I have heard it said that the nuts ought to pay something. If you go to a grocer in town and ask him for a bushel of black walnuts he will charge you half a dollar for them; but I think you could scarcely sell ten bushels of them if you wanted to. Will it pay to plant the white ash for commercial purposes? We know that wood is used for almost everything, agricultural implements, carriage making—in every useful branch of industry where woodwork is wanted the white ash will come in play; and, I believe, under the same circumstances where black walnut might be made profitable white ash might be too. To the westward of us, in the United States—in those treeless prairies—they are planting, the white ash very freely. They have great faith in it as a tree for forming shelter belts, as well as a timber tree. I believe the hickory would also pay. The nuts of that will sell for something. I do not know what the market price is. I know that the wood is being sought for for various purposes—for spokes of wheels, for felloes also, I believe—and for hammer handles, axe handles, and that sort of thing. I believe a plantation of hickory on broken soil—on ground suitable for it—would be a profitable investment for a man to make. I think the time is coming when these subjects should be agitated and discussed. It would not take long to compute how much lumber you could get off a given acreage by knowing a little of the growth of these trees. I have been told about the hickory, that the demand for hoops is becoming so great that it would pay to set out a thick plantation of hickory trees, let them grow to perhaps a little thicker than your thumb, and then cut them down and split them in two for hoops.

Mr. Drury.—There is one native evergreen which I think the Secretary has overlooked—that is, the cedar. I was not aware, myself, until this last summer, that it was possible to get it to present such a fine appearance—not until I had an opportunity of visiting the farm of Mr. Dawson, in the County of Kent, about a mile from Chatham. There I saw cedars carefully trimmed and pruned to the most beautful shapes. Of course, we know that if we allow a tree to grow as it will, without any pruning or shaping, it is not likely to present a very attractive appearance. The cedar is a tree that could be used for hedges. I do not say that it would be a lasting tree, but I have known it to last as a hedge for twelve or fourteen years. I saw a hedge of that sort on Mr. Dawson's farm. Near my own place a large orchard is partly enclosed by a cedar hedge, and it presents a very nice appearance. Then, too, I think the Secretary has hardly placed the spruce in its proper position as an ornamental native evergreen. The spruce, in my opinion, is one of the very finest of native evergreens. Its colour is very pleasing, and without giving it any attention it will grow into a very nice shape. I fully agree

with what he has said in regard to the hemlock. The white pine also is a tree that can be pruned into shape. I have seen a very nice little arbour made by planting four or five pine trees in a circle, and then trimming the inside and the outside. This can be seen on Mr. Dawson's farm. I am not disposed to think it would pay just at present to plant the white ash for commercial purposes, because it is a tree that is growing in considerable numbers in various parts of the country already.

Mr. Beadle.—Is it the red cedar you are speaking of?

Mr. Drury.—No; it is the white cedar—the *arbor vitæ*.

Mr. Beadle.—It is the *arbor vitæ*, but not the white cedar; what is known by botanists as the white cedar does not grow here. The *arbor vitæ* would make a very pretty hedge, and bear trimming as you have said.

Mr. Beall.—Questions have very often been asked me within the last year or two as to what size the black walnut will attain in a given number of years. I have been endeavouring to find some answer to the question, but I have not succeeded very well. I am hoping, however, to get more correct information from England on that subject. I think the probabilities are that there are English authorities more reliable than anything we have in this country as to our Canadian black walnut. We find that the Canadian black walnut was introduced into England in 1656; and I know of one tree that is about 153 years old, standing in England at the present time. That tree is now upwards of five feet in diameter. It is at Fulham Castle. It is now in a perfectly healthy condition.

Mr. Dempsey.—We have in our neighbourhood a black walnut tree—I could not tell you the age of it, but it is very little less than two feet in diameter at the base of the trunk. The limbs branch low—probably six or seven feet up. I asked the present owner of the property how old the tree was. He said, "Oh, I don't know; it must be about 120 years old, I think." I asked him how he knew. "Why," he said, "it was planted by my grandfather." "But," said I, "the county has not been inhabited more than seventy years." I think it was probably planted about seventy years ago. There is another tree I took Mr. Beall to look at, is planted in another part of our county, which would make about two standard sawlogs. That tree also must be about seventy years old. There is a hickory tree that stands very near my house on a neighbour's premises, which forty years ago I saw an uncle of mine pruning up. It was a little bigger than my thumb at that time. That tree has more than twenty inches of diameter of trunk now. The whole tree is not standing; it forked, and in a heavy gale of wind it split down, and half of it has failed. I fancy that the black walnut or the hickory could be brought up in thirty years—perhaps twenty years—to quite a commercial size, and I believe it would be profitable if properly cultivated; but it would be necessary to cultivate close so that the branches would not lie too low.

The Association then adjourned *sine die*.

SUMMER MEETING.

The Summer Meeting of the Fruit Growers' Association of Ontario was held in the Town Hall at Trenton, on Thursday, the 13th day of July.

Order was called by the President, Mr. Dempsey, at half-past nine o'clock, when the discussion of the first question on the programme, "Is the Cultivation of the Raspberry for Market profitable?" was at once entered upon.

PROFITABLENESS OF THE RASPBERRY.

Mr. Gott having been requested to speak on this subject said:—I am very sorry that you have called upon me to speak to a question of this kind at so early a period of the meeting, as I have not thought of the matter to any great extent. To the question "Is the Cultivation of the Raspberry for Market profitable?" I should, however, say most

decidedly, yes. It comes in at a time when fruit of that class is very much needed—just after strawberries are done, and when consequently the demand for something of that sort is very great. I would beg leave to decline advancing the discussion any further at present. I should like to have an opportunity of thinking of that matter a little more.

MR. YOUNG.—So far as my experience has gone I have found raspberries to be very profitable for the market. I have cultivated two red kinds, the Clark and Philadelphia red. I find that the Clark is a very fine berry. It sells as well, and brings a higher price, but is not so productive—not, probably, quite so profitable—as the Philadelphia red. It is a little too soft for market. The Davison's Thornless has done very well with me. In a very dry time it is very apt to dry up. On the whole, my experience is that raspberries of the different varieties are profitable for market.

MR. GOTT.—Very much depends on the cultivation and the location of the plantation, and also upon the season in which the berries are grown. For a profitable raspberry plantation you require deep soil, very fertile, and not too much exposed to the influence of the sun. The berry requires to be planted in regular order and thoroughly cultivated. It should be kept thoroughly clean. The canes should be pruned when the young cane is rising, say, about three feet. It should be carefully pruned so that it gets no higher. That practice should be applied to both the black caps and the red caps. The result will be that the side branches will start out the whole length of the cane, and the fruiting qualities of the cane will be more than doubled—sometimes trebled. The site, too, has quite an influence on the raspberry crop. Where the site is very dry, and very high moisture is lacking at the time that the raspberry needs it, the consequence will be that the crop will dry up. To obviate this a site should be chosen which leans from the sun, gently towards the north. This has a very good effect upon the fruit. The distance that we plant for profitable culture is four feet between the rows and three feet in the rows, and the old stools keep perfectly to themselves. In the spring we go through with the cultivator and the hoe. In this way we keep the raspberry plantation looking very pretty. At the time the fruit is ripening it is really a picture worth looking at. The blackcaps require a little different management from the red, especially if young plants are required, but it is found not to be profitable to raise young plants and fruit at the same time.

MR. EDWARDS.—Although I am in a very small way in raspberries, still I should say that raspberries would turn in money at an average of about ten cents against strawberries at eight cents. The crop will run in about the same proportion against the raspberries again—there will not be so many raspberries taken off the same amount of ground as of strawberries. But it must be remembed that raspberries will last a greater number of years than strawberries. You are only losing the use of the land one year in five with raspberries, whereas with strawberries you lose the use of it one year in two, or one year in three, at any rate. I have a high board fence, and the scantling is four feet from the ground—that is, to the top of the posts; and I prune my raspberries as soon as they get to the top of the scantling. In this way I make a very pretty fence. The raspberries take up no room practically. I use pieces of buckskin or anything of that kind to tie the bushes to the fence. I find that the berries have done better with me this year, twice over, along the fence, than in the middle of the garden. I find sometimes that the young shoots coming up will die down in a short time. I do not know what is the reason of it. Perhaps somebody can inform me. Then I have had a dozen whole plants die.

MR. WRIGHT.—Allow me to ask the gentleman on which side of the ground is his fence situated.

MR. EDWARDS.—The fence is on the west side of the raspberries. The part I speak of in the middle of the garden is hardly in the middle. It is rather in one corner, and it also is partly shaded by the fence.

MR. WRIGHT.—I live so far north that it is very difficult for me to grow any varieties at all, and consequently my experiance has been very limited in that respect. A great number of varieties that other gentlemen in this room can grow I cannot at all.

MR. A. M. SMITH.—I find the raspberry crop quite profitable in the locality where I

live. I do not suppose it would be back where you have plenty of wild ones, but near all our large towns and cities it is very profitable.

THE PRESIDENT.—How does the cultivation of the raspberry compare with the cultivation of the strawberry in regard to expense and profit?

MR. A. M. SMITH—The expense of cultivating the raspberry is no greater, taking all things into consideration, and the profits with us, as a usual thing, are better. We do not grow strawberries much for market, because in our neighbourhood for the last few years the market has been rather overdone, and where strawberries sell at from five to six cents a quart wholesale it pays better to raise raspberries at from ten to fifteen.

MR. BEADLE.—Which will yield the most to the acre?

MR. A. M. SMITH.—Strawberries no doubt will.

MR. BEADLE.—Can you give us any idea how much more?

MR. A. M. SMITH.—I do not know. It depends on the varieties and cultivation. Some varieties of raspberries will produce as much as strawberries. Take the Philadelphia, for instance. But there is this about raspberries: if you get them once planted out you get a good succession of crops for five or six years, whereas strawberries you have to renew every two or three years. Taking the replanting of strawberries into consideration I think raspberries can be cultivated cheaper than strawberries.

THE PRESIDENT.—How much cheaper could they be cultivated? Could they be done for half the money per acre?

MR. A. M. SMITH.—No; I do not think they could. Perhaps they might be cultivated twenty-five per cent. cheaper. There is more pruning and the like of that in raspberries. That takes up some time, of course. As far as the mere cultivation of the ground is concerned, they are much easier cultivated than strawberries.

MR. BEADLE.—Don't you find it necessary to prune off the runners of some of your strawberries in order to get a good crop?

MR. A. M. SMITH.—Yes; some varieties we do.

MR. ALLEN.—Our wild crop is so large that we grow the cultivated varieties to only a very limited extent. There is one grower there who says it pays to grow them, however. I do not know all the varieties he cultivates. I know he did cultivate the Philadelphia largely for two or three years, and he said it paid him. Our wild varieties, however, sell at from five to seven cents as against ten to twelve cents for the cultivated.

MR. A. M. SMITH.—We have contracted for five thousand quarts at ten cents a quart for the Philadelphia for canning purposes.

DESIRABLE VARIETIES OF RASPBERRIES.

The next question considered was "What varieties of Raspberry are most desirable for Market, Drying, and Domestic use?"

MR. DEMPSEY.—This question was to have been introduced by a paper from myself. Unfortunately my time has been considerably limited recently. I prepared some notes yesterday, but I came away and left them in my office. However, the subject is quite an extensive one. The question should be a trifle changed. I should have altered it a little in my paper, and simply have considered whether raspberries are profitable for the farm. Mr. Gott has given you a description of their culture, so that that part of the subject it is not necessary for me to speak of further than to say that the red raspberry requires very different treatment from the blackcaps. They require considerable shade, and if we can provide shade in some way without reducing the fertility of the soil it is very much better than if we are obliged to plant them in the shade of trees. Such a site is very difficult to obtain, however.

MR. BEADLE.—Which is it that wants shade?

MR. DEMPSEY.—The red ones—the common wild varieties and their seedlings. When it comes to a question of which varieties are profitable for drying and for domestic use, the first thing we have to look for is a variety that is sufficiently hardy to

endure the severity of the climate. We find, in experimenting with our cultivated berries, that such varieties are very few. First among the red varieties I would place the Highland Hardy for a farmer, or for any person who was an amateur grower. For market purposes I do not think that we require it at all from the fact that it comes in conflict with the strawberry—comes in a little too early. An amateur grower wants a few early raspberries, but we do not want them to interfere with the strawberries. Next I would place on my list the Philadelphia red—not on account of its quality—the flavour of the berry—because it would rank third in regard to that point, but it certainly will produce more fruit than any other variety I have ever seen grown yet. The yield is simply enormous. I have seen, in a row of those berries only thirty rods long, six girls picking from morning to night, and not get through with the single row. So that you can judge what an acre would produce of those raspberries. I would place next as amateur berries the Clark and Herstine. The difference in those varieties is very slight when we come to compare profits. The Herstine is not so likely to become small and crumble up as the Clark. It is not so soft as the Clark, and I think it is fully as prolific and fully as hardy. I would place next the Turner and the Reliance. Those are seedlings of the Philadelphia. I think they are nearly as prolific as the Philadelphia—perhaps quite so; and they are nearly double the size of the Philadelphia. But I fail to find any improvement in the flavour; they are very near the same. But were I to be confined to the cultivation of one raspberry I would choose the Cuthbert. The Cuthbert so far with us appears to be perfectly hardy. I have never seen a cane frozen. Of course it has only gone through two winters with me. It seems to be quite prolific. We do not get so many bushels to the acre of it as the Philadelphia, but I certainly think one bushel of it quite equal to two of the Philadelphia. It seems to be sufficiently firm to ship any distance that we can ship strawberries. I think I would be justified in saying that it is a first-quality berry with regard to flavour. The Cuthbert would be very profitable for drying purposes. I find that people who have got berries from us prefer the Philadelphia to all other varieties for making raspberry jam. When you come to the black cap varieties they are very easily cultivated. It seems like no labour at all to grow a few rods square of any kind of raspberries, in fact. I prefer to have three or four varieties, and I would place first of all, on account of its ripening early, the Doolittle. Some of you, in view of all the new varieties that are in cultivation at the present time, may be a little astonished at my placing the Doolittle first. Nevertheless it is not to be despised, although it is one of the oldest varieties. Next to it I would place the Ontario. The Ontario is a long way superior to the Doolittle, but it matures a little later. It is very prolific; and the flavour is a little better than that of the Doolittle, I think, but very nearly the same. Next I would place the Mammoth Cluster; I think it will never be superseded. I thought the Gregg was going to be superior to all others for drying purposes and shipping, but I find there are a great many canes frozen on our grounds. I question whether it may not be a little tender in some soils. In cultivating raspberries we should avoid a soil which has too much moisture, as it encourages a late autumn growth. I have found varieties to prove perfectly hardly only a little away from others that would be frozen to death during the winter. For an amateur variety there is nothing in our premises that will compare with one of Mr Saunders' seedlings—two of them, in fact—No. 55 and No. 70. We might place them between the Doolittle and the Philadelphia red. In point of fact, they are like a sample of the two varieties mixed in together. The colour is, however, against them. They have a kind of purplish blue colour, and are not attractive in a basket, but they are quite as attractive as any when they get on the table. They do not all mature at once, which, I think, is an advantage in them, as in that way their season is materially prolonged. Another variety that I would not like to be deprived of the pleasure of growing, is the Diadem, a seedling of Mr. Arnold, but I would not like to say whether it is a red berry, or a yellow berry, or a white berry. It is liable to throw up a sprout which will produe yellow berries, while another will produce red berries, and another will produce berries that are almost white. And all from the same root.

Mr. Beadle.—Allow me just at this juncture to ask the meeting to be kind enough to accept your remarks as being perhaps as valuable as your paper, yet at the same time to request you to write out your paper in full. We have a use for papers besides hearing

them read here. We have here a comparatively small audience, but through our reports and the *Horticulturist*, we have an audience of not less than 2,500 people. We have an actual circulation of about that number, and we know that our reports are read by about as many more; so that I suppose about five thousand would be about the audience that we would have for that paper.

MR. DEMPSEY.—I will prepare the paper.

MR. GOTT.—There was one class of berries that was not mentioned by the President. They are the class known as ever-bearing raspberries. Why they are thus designated I can scarcely tell you. One of the best of these is an old English variety called Belle de Fontenay. If you deprive it of the early crop you will get a very excellent late crop. If you allow the early crop to mature you will only get a medium late crop. Another of that class of berries is the Marvel of Four Seasons. There are some objections to the first I have named. It is a very rampant grower, but that can be easily managed. Cut down the shoots and keep it in bounds, and it is a profitable and excellent variety. The fruit is simply superb. We think very highly of the Gregg up our way It is thought to be better than the Mammoth Cluster in some respects. It prolongs the season, and is found to be very profitable. We have had no indication of tenderness on the part of the Gregg.

MR. DEMPSEY.—How does it compare with the Mammoth Cluster in colour?

MR. GOTT.—We think it has a little darker colour, and not so much of the white bloom that the Mammoth Cluster has. It is of a beautiful shining black. There was another red—two indeed—that might have been mentioned also. One of them, called the Noami, we find to be equal to the Turner, and in some respects better. The cane is very productive, and quite hardy. There was a remark made about the Clark crumbling considerably. Now, we have never had this experience with the Clark. With us it is first-class both in quality and in productiveness.

MR. A. M. SMITH.—I differ a little from the President with regard to the Highland Hardy. We find it one of our most profitable market berries. It is free with us from the objection that he spoke of. In regard to its coming into competition with the strawberries, our strawberries are usually done by the time it ripens. As far as the other varieties he mentioned are concerned I would agree with him. I think our friend Gott has made a little mistake with regard to the Gregg—as to the white bloom he speaks of being darker than on the Mammoth Cluster. I think if he would reverse that he would have it nearer right. I think there is more of it on the Gregg than there is on the Mammoth Cluster.

MR. SAUNDERS.—I hardly think it would be well for this Association to recommend the Belle de Fontenay as a berry for even amateurs to grow. I have been trying to grow it in London for a number of years, and have rarely had anything on it—sometimes a few berries at the end of the year, but not enough to pay for cultivating it. Mr. Gott's premises are admirably adapted to growing raspberries. The soil is exactly fitted to it, and is in close proximity to the lake. In our section of the country I have never known but one man who has grown the Belle de Fontenay with anything like success, and he exhibits the fruit very late as a curiosity. I do not think it would be a very profitable variety to grow for market. Some notice has been taken of my own seedlings by the President; and as I have no plants to sell I suppose I may say a word on the point. The seedlings apppear to be more hardy than any varieties that I have. I still have the old plants that have been growing for eight or nine years, and they are still bearing good crops. No. 55 seems to me one of the most desirable, although 70 is about equally good. 69 is another one that stands about the same as 70. 69 comes in about the time of the Philadelphia, whereas the 55 comes in later. The colour of these berries is against them as market fruits, but for canning they are very delicious indeed; and in cooking them, of course, the dull colour of the surface of the fruit entirely disappears, and they make a prettier jam than you can of the Philadelphia or the Doolittle. The Mammoth Cluster succeeds better than the Doolittle on my grounds. The Philadelphia, of course, is a stand-by, and produces a large crop.

MR. BEADLE.—With regard to the Belle de Fontenay, I am glad Mr. Saunders cautioned our friends about it. In our part of the country—the County of Lincoln—we find it is not a desirable crop to grow. If you allow it to bear a summer crop it comes

in with the other raspberries, and it possesses no qualities different from the others. Then if you allow it to produce an autumn crop our appetite for raspberries is gone then, and we are getting in our autumn fruits. But there is a place in Canada where just such a variety as that is desirable. I remember receiving a letter from a gentleman in Ottawa in which he spoke very highly of these autumn-bearing raspberries. They did not have any peaches there, he said, unless they bought them at very high prices, and he thought these autumn-bearing raspberries quite an acquisition to them. Mr. Wright lives up in about as cold a part of the country as there is, and perhaps he can tell us whether he finds these autumn-growing berries valuable there.

MR. WRIGHT.—I have been led astray so often by people recommending varieties that really were not what they represented them to be that I have become skeptical on a great many of these points. With us the great thing is to find a variety that is perfectly hardy. My experience has not gone over a great many years; and if I were to recommend a variety here and say it was perfectly hardy, I should want it to be so. Now, I contend that no man in one or two or three years can tell whether a variety is hardy or not. At least, that has been my experience. There are a great many sections of the country that are very trying on all kinds of fruit; and I live in one of those sections. Now, the hardiest variety I have found yet among the red varieties—if you call the one I refer to a red variety—is Saunders' No. 70. It is not the choicest variety you can have, but it is the choicest I can grow. I had this last winter, the Cuthbert and the Saunders No. 70 growing side by side; and every single cane of the Cuthbert was killed to the ground, and not a single portion of the Saunders' No. 70 was killed. With reference to black raspberries: the variety that has proved most hardy with me is the Mammoth Cluster. It has turned out tolerable hardy, although even it has suffered injury some winters. There are a large number of other varieties that I have under trial, but I think it should not be desirable either to praise or condemn them until I have had further experience of them; as to do so might lead people astray.

MR. MATTHESON (Ottawa).—My case is precisely that of Mr. Wright's in regard to Mr. Saunders' raspberry.

MR. BUCKE.—The Saunders' raspberry that I have is an exceedingly prolific one. I do not know what number it is. The only objection that I find to it is that the shoots break off very readily in a wind. As a canning fruit there is no raspberry that can compare with it. It has a peculiar flavour of its own. I have some seedlings from Mr. Saunders' raspberry that I thought very highly of last year, but whether because they grew so long, or for some other reason, they have not come up to my expectations this spring at all.

MR. SAUNDERS.—That breaking off of the canes—is it due to the deposit of the eggs of an insect?

MR. BUCKE.—No.

MR. SAUNDERS.—I think that may be accounted for as owing to the fact that Mr. Bucke manures his ground so much that the canes grow very high.

MR. DEMPSEY.—Have you ever practiced pruning back when they attained a certain height?

MR. BUCKE.—No.

MR. DEMPSEY.—Any raspberry will break off if it is allowed to grow up five or six feet high.

MR. BEADLE.—I was just going to suggest as a remedy that which has just been mentioned.

MR. WRIGHT.—I never discovered anything of the kind in mine; and I may mention that no attention whatever is given to those raspberries of mine. They are in the most unprotected portion of my grounds—that is, facing the north. I find that the portion facing the north is the best part of my grounds for raising any kind of fruit.

MR. PECK.—My Mammoth Cluster was blown down by the wind.

MR. WRIGHT.—I would like to ask if the Belle de Fontenay is a hardy variety.

MR. DEMPSEY.—With me it is sufficiently hardy until fall, but we find invariably the canes are dead in the spring. We get a crop from the new wood, however—the branches from the bottom. It is an autumn bearer; and in the case of any of these

autumn bearers it does not matter whether they are hardy or not. It would certainly be no good to you for a summer crop.

MR. A. M. SMITH.—This variety has been sent out under another name. A few years ago they were recommending an autumn variety very much on the other side, called the Amazon. I sent and obtained it; and it was exactly the same.

MR. BEADLE.—A very enterprising firm in Connecticut brought out a raspberry with a great flourish of trumpets, called the Henrietta; and it was nothing but the Belle de Fontenay again.

MR. BUCKE.—Has anyone tried the Franconia?

MR. LESLIE.—It is all killed with us this year.

MR. SAUNDERS.—It has killed with me the last three years. We have not had a berry.

MR. BEADLE.—I have had to give it up.

PROFITABLENESS OF SUMMER APPLES.

The next question on the programme was "Is it profitable to grow summer varieties of apples for market?"

Under this head Mr. Beadle submitted the following paper by Mr. Linus Wolverton, of Grimsby:—

IS IT PROFITABLE TO GROW SUMMER VARIETIES OF APPLES FOR MARKET?

BY L. WOLVERTON, GRIMSBY.

In answering the question before us there are several circumstances which need to be considered. To the farmer who has his fields of grain to harvest, an early apple is unprofitable, because at that time of the year he cannot give it the attention necessary to market it successfully. To the fruit grower who is situated at an inconvenient distance from trains or markets, early apples are unprofitable, because the most successful way of shipping them is in small, well selected packages. But to the large grower who is situated near a good market, or to a convenient shipping station, we are confident the summer apples are profitable, and of late growing in favour.

Poor apples are a drug at any season of the year, and some of the early and small varieties can scarcely be given away, but prime fruit, properly handled, can always be made profitable whether it be in spring, summer, autumn or winter.

The question then is, have we early apples of prime quality? Let us bring under our review some of the most prominent varieties.

The *Early Joe* is well spoken of in some localities, a yellowish apple of excellent quality; but it is too small and not sufficiently productive.

The *Baenoni* is an excellent apple from Massachusetts. It is pale yellow, marbled with crimson, pleasant to the taste, and very good for table and market; but it is too small to be planted largely for profit.

The *Early Strawberry* is a beautiful apple having its origin near New York City. It is yellowish, and is striped and stained with bright and dark red except on the inner and lower boughs where the sun does not penetrate. This apple would be highly profitable by reason of its beauty, but for two faults; first, it is a shy bearer, and second, it is very uneven in size, the fruit on the inner and lower branches being sometimes so small as to be quite worthless.

The *Golden Sweet*, an old Connecticut apple, deserves notice. The fruit is above the medium size, of a pale straw colour, and is produced each alternate year in enormous quantities. Coming into maturity toward the end of August, and fit for shipping soon after the beginning of the month, it commands a ready sale at a time when the markets are scantily supplied with apples. It usually brings from $2.00 to $2.25 in the Montreal market.

The *Sweet Bough* immediately precedes the Golden Sweet, and this promises to be a remunerative apple. It is large, of a beautiful light yellow colour, and it sells well in baskets as a dessert apple. But for this purpose it must be gathered, like peaches, a few at a time as they mature.

The *Early Harvest* is a well-known American apple of a bright straw colour, when mature, and bearing heavy crops every alternate year. This apple has no peer in the market during the month of July. It is a general favourite, and gains favour annually. The time was when this apple was sold at Grimsby for 50c. per bushel, but now a basket of fine specimens, or about one third the quantity, will often sell for the same amount. But to realize the best prices, proper handling is all important, and to do this the grower must be wholly devoted to his business, for if his attention is drawn aside by a crop of grain just when his harvest apples need their first picking, he will find them wasting on his hands. The Early Harvest bears heavily, and ripens unevenly. It needs its first picking while apples are quite immature to thin the crop. These will bring a good price for cooking, and the balance may be shipped in baskets or barrels as they approach maturity. I remarked that it bears heavily, but the fruit being small, the average yield per full grown tree is only about four or five barrels, and not half what may be expected from a Baldwin or Greening.

I will now give you a table of prices obtained for Early Harvest apples for three years past which will give a practical turn to my rambling remarks.

1879	July 9th, Toronto Market	$2.25	per bl.
"	" 29th, Montreal "	$3.50	"
1880	Aug. 9th, " "	$3.50	"
"	" 19th, " "	$3.00	"
"	" 17th, " "	$3.50	"
1881	July 21st, Montreal "	$4.00	"
"	" 8th, " "	$3.00	"
"	July 25th, Toronto "	60	per basket.

These are a few figures of actual sales from our shipping book, of course the best we have to show, but they suffice to show the possibility of getting good prices for summer fruit.

Now we have to mention the apple which heads the list as a summer apple, viz., the *Red Astracan*. For beauty nothing surpasses it during the whole season, while its delicate bloom reminds us of the dainty grape. It is a Swedish apple, and reported to be very hardy. Its quality is good if picked before it becomes mealy, and this is just where the grower must exercise much vigilant industry. The apple ripens more unevenly than any other, and must be harvested every four days for a period of two or three weeks.

The package which presents this lovely fruit to best advantage is the peach basket covered with red gauze. Baskets of well-selected specimens of this apple have sold at 60c. to $1.00 per bushel in Toronto, when the supply was not too abundant.

The *Primate* is spoken well of by Mr. O. T. Springer, of Burlington, in the report of 1869. He says he "shipped by boat to Montreal, the Early Harvest and Red Astracan, followed by the Primate and Early Strawberry; they arrived in good order, and realized the highest market price. He found the Early Harvest liable to crack and spot, and would plant the Red Astracan in preference. He thinks the Primate a good apple for shipping, a good bearer, firmer than the Early Harvest and a better bearer than the Early Strawberry; it can also be shipped a little greener."

I now present a list of the more prominent varieties of summer apples for market in the order of ripening: The *Early Harvest*, *Red Astracan*, *Sweet Bough*, Golden Sweet, Benoni, Early Joe, *Early Strawberry*, and Primate. I have written in italics those which I think most profitable in Western Ontario.

And now I conclude this paper by again stating my belief, that to the fruit grower who is wholly given to his profession, there is profit in having apples to market at all seasons, notwithstanding that sometimes he may meet with discouragements in the way of very low markets, or partial failure of his crop.

MR. GOTT.—Summer apples are grown very largely with us. Almost every person has them; and as soon as they are ready to sell the market becomes glutted with them. If the grower is careful, and can get his apples into the local market early they will be very profitable, but if not they will not.

MR. CROIL.—I have not found the growing of summer apples profitable. They are too perishable. We prefer waiting for the later ones.

MR. DEMPSEY.—Have you any variety sufficiently hardy?

MR. CROIL.—St Lawrence is our favourite early apple.

MR. BEADLE.—Have you none earlier than that? Isn't the Red Astrachan about a month earlier? We have it. It is nearly a month earlier.

MR. DEMPSEY.—What varieties have you tested there, Mr. Croil?

MR. CROIL.—I have purposely avoided the early apples with the exception of the St. Lawrence, and, I think, one or two trees of the Red Astrachan. The others, I have found, were not profitable.

MR. BUCKE.—A gentleman has a small orchard near Ottawa of the Duchess of Oldenburg; and he claims they are a very profitable apple. He says he never had a tree killed, and he can get fruit in advance of anything he can get from the States. He has not a great many barrels, but he says he could sell a thousand bushels if he had them, and that they would be worth from three to three and a half dollars a barrel. They are ripe about the first of September, I think.

MR. BEADLE.—Early in September with us. I should think it would be about the middle of September with you.

MR. DENTON.—Yesterday I passed Mr. Kettlewell's orchard, and the Duchess are the only trees he has bearing this year. The others are perfect failures. He said the Duchess was the most profitable variety he had.

MR. BEALL—A remark that was made by Mr. Beadle just now is, I think, calculated to lead some persons astray. He said that with him the Duchess of Oldenburg would be ripe by the first of September, but that farther north, where Mr. Bucke lives, it would not probably be ripe until the middle of September. The implication would be, of course, that the farther north we are from the Lake shore, the later the fruit will be. Now, I think that it can be shown that that is not a fact. I have a large number of the Duchess of Oldenburg, and I cannot keep one on the tree—I have not one for sale when the first of September comes. They are all ripe and all gone before that time. About the first week in August they are quite fit to take to market; and I get a good price for them. I generally get seventy-five cents a bushel for all the Duchess of Oldenburg I can grow. Anywhere along the Lake shore they are a fall apple, and I generally class them as a fall apple. I attribute what I have stated to the fact of the climate being drier near the Lake Shore. I grow the Red Astrachan and the St. Lawrence also.

MR. BELL.—I have planted a great number of Early Harvest trees, and I have never had one grow. I have now two or three trees which I bought for something else, but which I believe are Early Harvest, and they are doing pretty well.

MR. GOTT.—There is another early summer apple that is found to be very profitable and very beautiful out west. It is called the Tetofski. I believe it is an apple of Russian origin. It is an apple of good quality, quite solid, a good shipper, and a very abundant bearer. It comes very early.

MR. BEALL.—I cannot allow the remark with regard to the Tetofski to fall without adding a word. I would not recommend any man to have more than two of the Tetofski. I think that would be the outside that any man should have. They are early; they are a beautiful apple; and in fact they are a very nice apple; but in a week or ten days

from the time they are eatable they are entirely gone. They are not worth anything. They are dry and mealy. They are not fit for anything but just for amateur use.

MR. GRAHAM.—The Early Harvest is about the only apple I have had any satisfaction with. I have got Red Astrachans; but there are very few of them that have borne anything. Those are the only two varieties I have in bearing. The Early Harvest is a fine variety. I think it is profitable. I prefer it to the Red Astrachan.

A MEMBER.—Is there a variety of apple that ripens earlier than the Early Harvest?

MR. GOTT.—The Tetofski ripens before it.

MR. DEMPSEY.—The Grand Sultan, grown on the same tree with us, ripens before it—about two hours.

MR. WRIGHT.—In our colder climate it is only the earlier varieties that we can grow. I do not want you to take what I say as law and gospel in regard to the hardiness of trees, as I have not yet had much experience. I have had great difficulties to contend with in trying to get fruit to grow at all in my section, for various reasons. In the first place, when I would go to a man's orchard and find a tree that was tolerably hardy and bearing tolerably good fruit, and asked him what variety it was, he knew nothing about it except that it was an apple. So far, the hardiest apple tree which I have found is the Wealthy. I find it hardier than the Duchess of Oldenburg, about which we hear so much. Next to the Wealthy I would recommend, so far as my experience goes just now, the Peach of Montreal, and the Mackintosh Red, which grows at a place called Tindale, back of Cornwall, where it originated. None of these varieties have been killed with me yet. Still, I have only been growing them three years, and that is not long enough to test them. The Peach of Montreal I find a very early apple, but you must understand that varieties of apples that would do very well with us I would not advise other sections of the country to use at all. If anyone can grow apples which last for a week, that is enough, because he can sell in a week all the apples he can grow, especially if they are an early apple. The Peach is an early apple; but it would not do for anyone to ship, it bruises so easily. The Tetofski comes very early, and with us it is all right; but it does not last very long. It drops very much from the tree. We lose a great deal of fruit because of its dropping before it ripens. Still, we always have a tolerably fair crop. The Wealthy keeps longer than any other apple grown in our part of the country. This year every tree of it is bearing heavily. Not one of them has ever been winter-killed in any degree. Another variety which I think is going to be very hardy, and which I think will prove better than either of the two I have been speaking of, is the Yellow Bellflower. It is not very handsome, and it does not look so well as the others; but it comes in sooner than they. I do not think the Red Astrachan is going to do in our part of the country at all. I have an Alexander that I think is going to live. I am in hopes it will prove hardy with me. There is another variety called the Magog Red Streak which has proved very hardy with me, and which I think will last in our climate. But before all—before the Duchess of Oldenburg, before any other variety—I would place the Wealthy apple. I think it is the hardiest and best apple for a northern climate that we have ever had anything to do with. Next to that I would place the Mackintosh Red. The Wealthy keeps longer than any other apple I grow.

MR. CROIL.—I quite agree with Mr. Wright that there are very few kinds that succeed in our neighbourhood at all. I think I might almost limit them to a dozen. The Mackintosh Red has been thoroughly tried in our neighbourhood. I have seen the original tree. It is now seventy years old, and it is bearing yet. But ahead of all the other apples as a hardy variety is the Fameuse.

MR. WRIGHT.—I might mention with regard to the Mackintosh Red that not only does it stand the cold, but in other respects it is the hardiest I ever saw. I can grow it where I cannot grow the maple trees at all.

MR. DEMPSEY.—I wanted to ask you if you had ever fruited the Irish Peach. You spoke very highly of the Montreal Peach; I would like to know whether it is the same apple or not?

MR. WRIGHT.—I do not know; I never heard of it.

MR. BUCKE.—Might I ask Mr. Croil where the Mackintosh originated?

MR. CROIL.—In the county of Dundas.

MR. WRIGHT.—The Mackintosh Red has kept with me till the middle of winter without any trouble, and is about as handsome an apple as anyone would want to put on any table.

MR. LESLIE.—I find the Peach of Montreal to be the same apple identically that we have had for years called the Indian Rajah.

MR. DENTON.—I find that the general crop of apples around London is greatly a failure this year. I would ask whether that is general or local, and what is the cause of it?

MR. YOUNG.—I am afraid the apple crop will not be so abundant as we were in hopes it would be.

MR. BEALL.—In the neighbourhood in which I live the apple crop will be more abundant than was ever known before, judging from my own observations and from the reports I have got from a large number of small growers.

MR. YOUNG.—Do you grow apples there extensively for market?

MR. BEALL.—No.

MR. DEMPSEY.—Have you had any experience in growing apples for drying or for cider?

MR. PECK.—I do not think that our summer apples have been converted into cider or dried; for they have not been raised that extensively here, and what have been raised have been consumed at home or shipped off.

A MEMBER.—Do you classify the St. Lawrence as a summer apple?

MR. PECK.—We do not. There have not been any places for making cider here until last fall.

MR. DEMPSEY.—The object in introducing this question was to ascertain in what way we can convert our surplus early fruit in a manner sufficiently remunerative to encourage us to cultivate it.

MR. BUCKE.—I do not think that summer apples, as a rule, are grown in any quantity by anybody.

MR. DEMPSEY.—There are localities where they cannot grow any late-keeping varieties of apples; they are confined to the growth of summer varieties. Why this is the case I am not able to tell you; but it occurs to me that the earlier in the season the crop of fruit is removed from the trees, the better the opportunity that is afforded that tree to mature its wood and to be prepared for the severity of the winter. But if the fruit is removed early by people living in the sections of our country in which the climate is more severe, they are in danger of getting a surplus of these early fruits. I would encourage the growing of the early varieties in such sections as this, where we can grow the later-keeping apples such as they cannot grow successfully in such localities as Ottawa and Renfrew.

MR. BUCKE.—The time has not arrived yet when we grow so many apples in the northern section of the country that we cannot use them.

MR. MATHESON.—I would like to know whether the summer apple is suitable for drying purposes. I have no doubt the varieties of apples mentioned by Mr. Wright, particularly the Duchess of Oldenburg, can be grown as extensively there as in any part of Ontario; and whether that apple can be used for drying is something I would like to know.

MR. DEMPSEY.—Is there any person present who has attempted to dry early apples

MR. MALLORY.—The St. Lawrence is a very superior apple for drying. I have tried it. I have no acquaintance with the Duchess of Oldenburg.

MR. A. M. SMITH.—I have never had any experience myself, but I have heard the Duchess of Oldenburg mentioned as a very good apple for drying by a person engaged in the evaporating business.

MR. WRIGHT.—I would like to know if there is any way of protecting fruit trees which are not quite hardy enough for our section of the country. I have had a good deal of experience in protecting trees, and the result of it has been to lead me to believe that the more they are protected, the worse they are off.

MR. FRANCIS PECK.—I live north of Peterboro'; and I was told that if I took some of the tender varieties and tried to make them hardy, I could do so; but my experience is that you cannot make them hardier.

MR. WRIGHT.—I may mention one experiment I tried. I thought that if I could protect the main trunk of the tree, the rest would perhaps live. So I had my man go to work and make a lot of hay wisps such as come around bundles of cutlery of the sort that farmers use, and I wrapped the fruit trees in my ground around with these from the earth up to the top. The next spring when I took that hay off the tree I could see like a spiral groove going up the tree where the wisps of hay had gone round. It was black wherever the hay had not touched; and there the bark was as green and fresh and nice as could be. I tried that two winters in succession, and I found that my trees were worse off instead of better.

MR. BEADLE.—I would like to ask Mr. Wright if the snow falls at his place in time to prevent the frost from getting into the ground to any depth.

MR. WRIGHT.—Oh, we have any amount of frost. It goes right down through the snow and everything else; and sometimes it comes long before we have any snow. The only thing I have found to do any good is to draw muck and put it around the bottom of the trees. That prevents the frost getting in so soon. The frost breaks through and tears the roots all asunder.

MR. BEADLE.—In our climate we are not troubled about tender apple trees; but we sometimes have things in regard to which we are in doubt as to whether they will stand even that climate—more particularly ornamental trees; and we find that by mulching the ground with barnyard litter we succeed in keeping the trees hardy enough to bear the winter. It is a fact that is well established with us that many trees will perish from the cold of winter because their roots are kept so solid and so hard during a long period of time that the trees die; but if we can succeed in getting them to live until they root out into the moist soil below the frost, then we often succeed in getting them to grow, and live, and bear our winters well. The theory that we have in regard to this is that the cold winds and frosts of winter are always drawing up by evaporation a certain amount of moisture from the tree although it may have no leaves on it.

MR. WRIGHT.—This experience is entirely different from my own. We have adopted an entirely different plan. If we allow the roots to go down the frost will tear them right asunder. So we have to try and prevent the roots from going down; and in order to do that we adopt this plan:—We get a large pine tree—as large as we can—and saw slabs off it about three inches thick and thirty-four inches wide; we lay these down in the ground and lay muck on top of them; then we plant our tree on that, and raise it up as high as we can. The object of doing this is to prevent the roots going down any further, so that when the frost heaves it will heave all up together, and not go through this tearing operation. Then we have a mound around each tree in the fall.

MR. BEADLE.—Supposing you were to keep the frost out from around the tree altogether by a species of mulching?

MR. WRIGHT.—We cannot do it. The frost will go down there four feet. The mercury freezes in our part of the country.

MR. DEMPSEY.—It often occurs that there is a variety of pear or something else which we would like to grow, but which proves a little tender. I have found on my own grounds that some tender varieties of pears that I have grow very well if they are on the north side of a hardier foliage, and in a very thick clump. I cannot grow the Beurre de l'Assomption at all when exposed; but set beside other varieties in the way I mention I find it very hardy.

MR. WRIGHT.—That is my experience too. I may mention that on the grounds of the Fruit and Floral Company at Arnprior they have as fine a specimen of the Flemish Beauty as I have ever seen, which blossoms every year, but has never any fruit on it.

MR. BRISTOL (Picton).—About fourteen years ago I set out about 150 apple trees. Yesterday I went down and took a sort of inventory of them, and I assure you I felt a great deal discouraged. There were 156 trees altogether. I set them out in 1868; and at present there are fifty-two of them comparatively healthy, forty-nine unhealthy; and fifty-five dead and gone; and some of the fifty-five trees have been planted over and over again. Throughout the whole orchard the bark turns dark. I can show a specimen. (The speaker produced and showed a specimen of a branch of a tree diseased in the manner he described.)

MR. MALLORY.—Mr. Bristol's experience has been about the same as mine.

MR. DEMPSEY.—What is your soil?

MR. BRISTOL.—Principally limestone gravel, rather low, a portion of it is sand. It is a little point of land that runs into the Bay. Perhaps it would range in depth from about twenty inches up to four feet.

MR. DEMPSEY.—Does it frequently dry out?

MR. BRISTOL.—It does in the summer.

MR. DEMPSEY.—Do your trees start to grow again in the autumn?

MR. BRISTOL.—I have not observed that. My Greenings have grown hardier than they were. The Northern Spies have all looked healthy up to this past year; and now they are all affected by this same disease of the bark growing dark. I had one young tree just beginning to bear last year, as healthy as I ever saw; it grew in six feet of soil near my house. This spring I went to it, and four inches above the ground it was perfectly dead—girdled. I manured it pretty well.

MR. DEMPSEY.—Did you ever search for insects?

MR. BRISTOL.—I have searched, and have never found anything. I have been told that the trees show signs of sawdust; but I have never seen anything of the kind. I have frequently taken my knife and pared off a foot of bark, and found no insect. The trees are fully exposed to the north wind.

MR. BEADLE.—Have you noticed whether, if in the spring of the year, you dig a hole there two feet deep in the soil, it will fill in with water?

MR. BRISTOL.—No; no water ever stands there.

MR. SAUNDERS.—I think if Mr. Bristol will look under the bark of that sample he has brought here he will find plenty of evidences of the work of the borer, which clearly points to the fact that the injuries have been caused by it in that piece of tree. But I do not understand whether the unhealthiness of which Mr. Bristol complains is to be attributed altogether to the bark difficulty, or whether it may not have been caused this year by a fungus on the under side of the leaves which is very prevalent around London this year, and which I have noticed here too. The leaves, I have observed in a good many instances, are now falling off. This bark injury I think may fairly be attributed to borers; and the proper way for Mr. Bristol to proceed to prevent it in future would be for him, about the months of June or July—before the time the borer appears—to coat the trees with a solution of soft soap thinned with a water solution of washing soda to the consistence of thick paint and applied with a brush. The alkaline wash forms a coating over the bark and destroys the eggs of what insects may be about it, besides preventing the borer depositing its egg on the bark.

MR. DEMPSEY.—You who live in the country can just as well set up a leach and thin your soft soap with lye.

MR. SAUNDERS.—Lye will do. The idea is to get the alkaline strong enough. Lye alone might be too strong, but would do with soft soap. If you just put lye on the trees, the first shower will take it all off, but if you mix it with soft soap it will dry into a kind of varnish on the tree. You require a dry day for applying it in order that the preparation may dry. The season for applying these things would vary for different districts. The insects would appear later in the Ottawa district than with us. The egg state lasts somewhere about a week; and if this wash is applied any time during the existence of the egg state, it destroys the eggs. As a preventive measure the application needs to be made before the insects appear. When the eggs hatch the young grubs burrow through the bark into the interior to work between the exterior bark and the sap wood, and when they once get in there you cannot do anything with them.

MR. DENTON.—I would like to ask Mr. Saunders if in this disease he refers to, the leaves curl before dropping off?

MR. SAUNDERS.—Yes.

MR. MALLORY.—In respect to what Mr. Bristol says, there are some who seem to think the trouble is from a borer or an insect. I have watched this thing carefully for ten years, and I think I can safely say it is no insect that can be seen by the naked eye which causes it. In the first place a small spot appears on the side of the tree. The next year this extends to a circle of an inch or two. It will take three or four years per-

haps before it completely destroys the tree. A sort of water blister forms inside the bark. The only remedy that I can find is, as soon as you find this blight take an axe and cut the spot right out. If you do that it will not extend around the tree. I have a Spitzenburg in the middle of the garden on the very best of soil, and that is affected the worst of any tree I have. In the first year or two the bark adheres tightly to the wood, and there is no appearance whatever of insects inside.

MR. CARR.—It is my opinion these gentlemen grow their trees too fast, and they are caught in the fall when there is too much sap in them. There are places where you may grow your trees as fast as you choose; but by growing them too fast in those exposed places so that the frost gets at them when there is too much sap in them the whole difficulty is caused. This insect is the result of a worm that has worked there since the tree was dead. This solution of lye and soap is a splendid thing to kill anything like lice or insects, but that it will prevent this difficulty, I do not think. I think less manure and more care in getting your tree hardy is what is required. It is those trees that put out long shoots and extend their growth until fall that are most likely to be affected.

MR. DEMPSEY.—I had a tree affected by the borer, of which there are two kinds. This tree was a Yellow Bellflower, It was attacked near the fork of the branches. The tree was nearly half destroyed before I discovered it. I had the parts nicely cut out, and then through applying this alkaline wash the tree has become perfectly healthy. Mr. Saunders will tell you how the different species of borers operate in the tree.

MR. SAUNDERS.—I think my friend who has just spoken has not observed the workings of those insects, perhaps, as carefully as he might do or he would know that borers are not particular. They will attack trees that are diseased quite readily, but they will also attack healthy trees. I lost at first a great many trees from borers. After beginning to use this alkaline wash it was very rarely indeed that I saw any of the effects of their working. The disease in this specimen that Mr. Bristol has brought is evidently the work of a borer, but whether that borer has deposited its eggs on the tree after the bark has been discoloured or before, it is impossible to say. It often occurs that the sun scalds the bark in spots, and in many instances no doubt the borer deposits its eggs in the neighbourhood of these partly diseased parts; but if it has nothing but healthy orchards to work upon it will work upon them just as well as the bark that has become injured in that way. As far as the borers are concerned, I think the alkaline wash will check them.

The Convention then entered upon the discussion of the question: "Is Orchard Culture in the County of Hastings and adjoining counties profitable?"

MR. H. F. YOUNG (Trenton), promised to send in a paper on the subject. He also took occasion to observe:—I think if we set out proper varieties and take proper care of them, and then look for markets in which to dispose of the fruit, apple growing not only in these counties, but in almost any other county is profitable. It all depends upon circumstances whether it is profitable or not. In our counties, I believe, it is particularly so. I doubt if in any section of the country apple culture would be more profitable than in these counties. I have no doubt there are many gentlemen engaged in apple culture in this district who do not find it profitable, but that is simply because they have not got suitable apples. Their soil is not adapted to the culture of that fruit, or they do not take proper care of their trees. I have no doubt the climate will enable us to make apple culture in these counties very profitable. My orchard is the most profitable part of my farm—I think a hundred per cent. more so than any other part of it. Last year I had some trees that paid as much as ten dollars each, and I plant a hundred trees to the acre.

MR. JAMES H. PECK.—I have not had practical experience in this business except during the last three or four years. I cannot speak from my own experience so much as others in the neighbourhood. I agree with Mr. Young that fruit culture, where you have proper soil, proper varieties of apples for the foreign market, and even our local market, and where you can produce such apples as Northern Spies, American Golden Russets, Swaar, Rhode Island Greening, and Baldwins—although Baldwins here have been somewhat tender, I agree with him that under such circumstances fruit growing here is profitable. Until about twenty years ago we had not much fruit here except the common or ungrafted fruit. Apart from the few apples that were used for cider and the few that

were dried, many rotted on the ground. Now there are vinegar shops, where apples can be sold at from fifteen to twenty cents a bushel, so that money is made out of what used to go to waste. Our good winter varieties have commanded very good prices, and the yield has been amply sufficient to reward the fruit grower very well. Many of our fruit growers, I think, have realized more out of their orchards than they have out of their farms—that is, the orchards yield more clear profit, with less expense. Then, since we have been sending to the old country, some shippers have been realizing good returns. While I am on my feet, I would like to ask if there is any one present who ever shipped any fruit to South America. A gentleman with whom I was in conversation advised the farmers of this section who had good fruit to ship it to Brazil. I said it had to pass the equator, and the consequence would be that the fruit would spoil. He gave me the name of some gentleman—I think somewhere about Hamilton—who had shipped a cargo of apples to Brazil, and who had found that when they got there, two thirds of them were spoiled. They were packed in about the same manner that apples are packed to ship here. However, he sold his apples at twenty dollars a barrel—those that were in good condition—and realized a very good profit out of the transaction. If apples could be selected with greater care, and perhaps papered, it would be found a source of great profit to ship them there. About five hundred of my apple trees are Fameuses. I have the same difficulty to contend against that most have in this part of the country—that is, the operation of the borer. We cannot fight it very well. I think the remedy that has been described by Mr. Saunders is the only correct one. I think that fruit is the most profitable crop that our farmers here can raise, that it will return the most money for the smallest outlay.

Mr. George Arnold (Trenton).—From my experience, I think that apple growing is very profitable in this county. I do not know very much about it in the County of Hastings. Plant the hardy varieties, and they are very profitable. There is no mistake about that. There are several varieties that we cannot hope to plant at all. My opinion is that the Ben Davis is a very profitable apple; also the American Golden Russet, and several others that I could mention that are good bearers. The great object at the present time is to plant the varieties that are good for shipping, that will stand the voyage. The Northern Spy is a very good apple, yet it is not so good to stand the voyage as many others. I think there is no doubt that the cultivation of the apple is a profitable business, and will become more so. The demand is getting larger every year, and the cultivation of the fruit will be more profitable in the future than it has been in the past.

Mr. Francis Peck.—I was born and brought up in this place, and moved to the back country. I thought I could raise fruit there as well as here, but I found it could not be raised there, and I came back here again. My idea was to put out a large orchard, principally for profit. I did so, and have now had my trees out eight years. I had Snow apples last season from trees that bore two barrels on the average, and I sold them for a dollar and a half a bushel at home. I do not know of anything else that would pay me anything like that. I put out principally the Snow. I grew the trees north, and I very soon found out there the hardy varieties. I raised principally the Snow, with the Astrachan, St. Lawrence and Tallman Sweets. The Astrachan, St. Lawrence and Snow apples were the only hardy ones that would grow at all north, and when they did grow there, the trees would not produce anything like what they would here. I have out somewhere about 1,900 trees. I have been grafting this past winter. I grafted 1,800. I have a new apple that I got three years ago, called the Star, that I am much taken up with. It is very hardy, a vigorous grower, and the apple keeps as well as any, and has a first class flavour. The only objection was that the tree did not bear much, and I was dubious about growing it on account of that; but a neighbour of mine, when he got some of them, grafted them on another tree, and he said they then bore heavily. The Ben Davis is a profitable apple, bears well, but is very poor in flavour. As for profit, I do not know anything that pays as well. I believe we have as good a section of country for growing apples as any in the Province.

Mr. W. R. Dempsey (Aldboro').—I was sorry to hear from my friend from Picton that he had experienced such a failure. My experience is that there is more money and more fruit in the Colvert apple in our locality than in any other variety. Our ship-

pers to England find it one of the most profitable for their purposes. It turns out one of the best fall apples, and it realizes a good price. With me, among winter apples, the King of Tompkins has succeeded among the best. The Baldwin is also one of my best. I find that our success depends upon the cultivation and the soil. I believe that my friend from Picton has been sowing grain in his orchard. The Russet that Mr. Peck refers to is growing on a sandy loam. I believe that it succeeds very well there. But my Russets, grown in a limestone soil, are a failure. They get a good lot of blossoms in the spring, but I get very little fruit, and even the fruit that I do get is of an inferior quality. They are the American Golden Russet. I would not plant any more of them on my soil.

Mr. John B Williams (Bloomfield).—My soil is loamy, something of a dry nature, though very deep—you can dig probably twenty-five feet in it. The dry years do not affect the trees very much. Almost all varieties of apple will grow on this soil; but I have a variety of soils in several orchards. Some is a heavy clay soil. I have not succeeded on that as well as on the others, although it is on the same farm. On that I planted 300 Rhode Island Greenings, and there was only one tree lived of the whole. They grew well until they got to be five years old, when a warm rain coming in the fall, they continued to grow, and the leaves continued on them until the early frost came. In 1878 there were three days in November that the frost was very severe. Some of the trees sprouted the next year, and I thought they would recover. But the next year was also very severe, and they were destroyed entirely.

Mr. President Dempsey.—What is the probable profit from orchard culture in your experience, taking into consideratien all the failures?

Mr. Williams.—The Golden Russet I find very profitable. It stands at the head. I think it was about ten years ago that I planted an orchard of about 100 trees. I think four years ago I got 150 barrels of apples from it. This went up to 170 or 180 barrels; last fall I got about 150; and this year they are setting very nicely. This was on about three acres.

Mr. President Dempsey.—After planting, how long would it take three acres of orchard to pay its own expense and begin to yield you a profit; and after it does begin to yield you a profit, what would be the probable percentage of profit?

Mr. Williams.—The profits are increasing gradually. I think in about six years I realized from the three acres about $100 in fruit; and each of the two last years the three acres gave me about $500. I have succeeded very nicely with the Bailey Sweeting. For shipping, I have realized about as much from it as from anything. I would recommend for planting in this section, the Golden Russet, Ben Davis, Northern Spy, Talman Sweet and Bailey Sweet, and the Westfield Seek-no-further. I have tried the Wagener very extensively; and it appears to blight in the summer, something like the pear. It stands the winter all right. I have tried the Yellow Bell-flower, and it is all right, and has been all the way through. I have some 500 trees of the Duchess of Oldenburg. I sell the fruit from them in Montreal. I shipped some to Glasgow, and they went through very nicely. The Duchess of Oldenburg is giving me great satisfaction. I have found it profitable. I have tried a great many different varieties of apples, and I get more pounds to the bushel of the Duchess of Oldenburg than of any other variety I have ever tried. The American Golden Russet I generally call the English Golden Russet. I see it is laid down in some of the American catalogues as such.

Mr. President Dempsey.—I have observed, in this section of the country that, apples succeed on soils that nothing else will grow on. I was in company with Mr. Young, last fall, driving through the County of Hastings; and I discovered an apple tree there that was beautifully loaded with fruit, nearly every specimen of which was first-class, although it was growing on a drifting sand, near a pine stump, from which the sand had been blown away, and the necessity of using a stump extractor being thus avoided. I find, almost invariably, where fruits have failed, or where parties have not succeeded in orchard culture, that they have selected a site either where the soil was too shallow or where it was so heavy that it would maintain a late autumn growth. I think that if you observe this point particularly, this discussion will lead you to be fully convinced that this is the cause of so many people failing to make profit out of orchard culture. Mr. Graham is succeeding in introducing apples upon a heavy soil; but the position is

wonderfully elevated; and we find that Mr. Williams is succeeding on a loamy soil of immense depth; but it is sufficiently dry to produce a good healthy growth, and it retains a sufficient amount of moisture to maintain the growth during the season. Just below this, in the heavy land, he lost his Greenings. I fancy that, if we give more attention to the site when we are selecting an orchard, we can let the choice of varieties be a secondary matter.

Mr. Young.—I remember the trip we had, which you have spoken of; and I think both of us learned something. It is a fact, that we found trees flourishing on sand, and also a fact that we fonnd trees flourishing, and paying their owners very well, on very heavy soil. So that nothing was proved after all but that apple trees are not very particular about what soil they grow in. Perhaps it may be, that there are really but two or three questions for us to decide. First of all, I think, we must have a dry soil; one which is naturally so, is preferable to a soil which is artificially drained. The soil should be hard enough to retain the moisture necessary for the nourishment of the trees, and yet not so hard as to hold too much water. If the bottom is so hard as not to allow the water to go through, I think the trees will die away gradually. I have trees growing on a quite loamy land, and some growing also on a land which is quite stiff, and they are all doing well; but the land is well drained. It is not artificially drained; it is a porous soil. If people have not soil which is right, they can make it right; but it will cost them something to do so. If we have soil in these united countries that is suitable for apple culture, apple culture will be profitable; but if we make a selection of the proper soil and the varieties of apples are not suitable, we shall make a failure. I firmly believe I have over-cultured my own trees. I never grow grain among my trees. I have about ten acres of an orchard; and I cultivate about a third of it—what we call summer-fallowing. I run a gang-plough through that frequently—sometimes every week, if it is a growing time; but I do not cultivate much below the surface. I know of an orchard which is suffering for want of cultivation; and not only one, but scores of them. I believe people make greater mistakes in that way than in over-cultivating. Both the soil and the climate are very well adapted for the cultivation of the apple in these counties.

Mr. Graham.—You mentioned, Mr. President, that my apple orchard was in an elevated position. I have apples, too down in the valley. I have a Golden Russet that stands in drifting sand; and I picked four barrels of Golden Russets, as nice fruit as I ever saw, off it last fall.

Mr. Sing.—How long is it well to allow apple orchards to remain in grass?

Mr. Young.—If you allow an apple orchard to remain too long in grass, the tree will produce very few apples. If you leave the trees in timothy, for instance, for a number of years, I believe you will eventually ruin your orchard.

Mr. Carr.—Will mulching do instead of cultivation?

Mr. Young.—Yes; it will to a great extent.

Mr. Mallory.—I have always been very sanguine that orchard culture was very profitable, from what I have seen of apples. My own experience has not been very profitable. The trees that have been the most profitable to me are those that are standing in low ground. I have had finer Snow apples and more of them in a low, wet piece of heavy clay, where, in the spring, the water stands up on the trees until the frost comes out several inches, although in planting them, I planted them right on the surface and made a pretty good rise to have them up rather high, than I have had anywhere else. My Talman Sweets, on a loamy soil, where it was dry and sunny, were a failure.

Mr. Burrard.—The orchard pays just in proportion to the amount of care and labour bestowed on it. I was noticing yesterday, in riding through Prince Edward, that many of the orchards that have been let go to grass are done. We have an orchard of about ten acres, and in it nearly all the different varieties of soil are found, the sandy loam, the heavy clay, the black muck, and the gravelly; and there are varieties of trees that would do well on all of these different kinds. The great obstacle in the way of raising all fruit is the want of sufficient care in its cultivation. Cattle are let run in orchards, browsing trees; and the trees are sure to freeze during the winter. Last year we had abundance of all kinds of fruit, even peaches.

Mr. Beadle.—Where is your locality?

MR. BURRARD.—In Prince Edward.

MR. PRESIDENT DEMPSEY.—In the little trip I was speaking of, last fall, with Mr. Young, we visited one orchard which was in grass, and it was surface-manured. It was rather a light soil, and the man had made an effort to take a crop of beans off a small portion of the orchard. I presume the percentage of orchard occupied by the beans would not amount to a tenth of the whole area; and there was more fruit on that little spot that was occupied by the beans than there was on the whole of the rest of the orchard. I concluded that that was quite an argument in favour of the cultivation of the orchard. There were portions of that orchard where the trees were actually shedding their leaves before the fruit was ripe. I visited the same orchard last year and found the trees loaded with fruit—an immense quantity of Seek-no-furthers; and we found those Seek-no-furthers, early in October, lying on the ground already. The leaves had not only matured but the fruit also. Mr. Dempsey told you about his orchard of Colverts. He had one hundred Colverts which were planted in 1863 or 1864. Those hundred Colverts, or what he has left, produced 237 barrels the year before last; and those sold for $2.50 per barrel. I never could make any money out of a Colvert yet; but he does. We live close together too.

MR. BEADLE.—Mr. Mallory succeeds in growing fine trees and fine crops of fruit in a very low, wet soil. I do not want any gentleman present to go away with the idea, however, that that is the way to plant out an apple orchard. I do not know what the secret is there; but I know from years of experience and observation that apple trees or fruit trees of any kind planted in a cold, wet soil where their feet are wet and cold all the time, will in a little while die.

MR. ARNOLD.—I think the gentleman told us the trees are only ten years old. I think, if we come down here ten years from now, he will tell us a different story.

MR. MALLORY.—I did not wish to leave the impression that that soil was a good one on which to grow apples. The water goes away quickly after the frost comes out.

At half-past twelve o'clock the meeting adjourned until two o'clock.

Upon the opening of the afternoon session the President appointed a committee to examine the fruits and flowers on exhibition, consisting of Mr. Bucke, Mr. John G. Peck, and Colonel McGill.

PROFITABLE VARIETIES OF STRAWBERRIES.

The next topic, "What varieties of strawberry are most profitable?" was introduced by a paper by Mr. A. M. Smith, which was published in the *Canadian Horticulturist*, vol. 5, pages 196-198.

REPORT OF COMMITTEE ON FRUITS EXHIBITED.

CITY HALL, TRENTON, July, 1882.

The Committee on Fruits exhibited at the summer meeting of the Fruit Growers Association of Ontario, have the honour to report :—

STRAWBERRIES.

Mr. A. M. Smith, of St. Catharines, showed a number of varieties, amongst these were Late Cone, Glendale, Windsor Chief, New Dominion, Early Canada, Sharpless, Bright Ida, Belle, Little's Seedling (No. 5), Arnold's Pride (No. 23), Miner's Prolific, and some mixed varieties.

Little's Seedling, No. 5, is a peculiar berry, of an exceedingly deep red color, with much indented seed pits.

New Dominion holds its already high place as regards size and color.

Bright Ida, rich looking and beautiful.

Windsor Chief, medium size, firm, and well colored.

Sharpless, not uniform in size, though some berries very fine.

Your committee regret much that owing to the late heavy rains, the flavour of the above varieties could not be very well tested.

Mr. Charles Arnold, Paris, showed a curious sprout produced by hybridizing, the stem of a strawberry bearing thirty-four berries on it. The fruit was of no great value.

GOOSEBERRIES.

Mr. William Saunders, London, exhibited three of his hybrid gooseberries: These were a cross between Warrington red and the wild prickly variety—both parents are hairy to prickly. The largest of these was of good size with very stiff hairs, verging on prickles; the second lot were smooth, and also of good size, as large as Downing; the third was a small berry and showed the peculiarity of having two berries, which are smooth, attached to each fruit stem. All three varieties are heavy bearers, as showed by branches to which the fruit was attached. Of course at this season the fruit was unripe.

R. Kettlewell, London, Ont., sent four varieties of gooseberries—White Smith, Roaring Lion, Downing and Houghton. They were all well loaded and free from mildew or other disease. He also showed some handsome specimens of the Red Cherry Currant and sprigs of Quinces.

RASPBERRIES.

Mr. A. M. Smith, St. Catharines, placed on the table a basket of the Highland Hardy raspberries, quite ripe.

Kettlewell and Warden, London, Ont., sent some handsome plates of roses, set in moss, to decorate the tables, but the gem of the exhibition was a magnificent bouquet, arranged with much taste and presented by Miss Dempsey, the fair daughter of the President, made of flowers gathered on his grounds. The flowers were principally roses interspersed with very fine spikes of doutzia crenata.

Respectfully submitted,

P. E. Bucke,
Col. John McGill,
John G. Peck.

Mr. Arnold.—I fruited the Early Canada this year for the first time, and I think I am safe in saying, so far as my experience goes, at any rate, that it is the earliest strawberry grown. It is earlier than the Early Hudson. I think it is earlier than Metcalf's Early. I have not had much experience with it, and I would not like to speak of any other quality than its earliness. What I want is earliness. Let me supply the early berries and I do not care who supplies the others.

Mr. Beadle.—How did Arnold's Pride succeed with you this spring? Did it kill your Arnold's Pride?

Mr. Arnold.—Yes. All strawberries suffered pretty much alike with me. I do not know of any one variety that suffered much more than any other. The Sharpless, I am somewhat inclined to change my mind in regard to. I was very severe on it last year. However, it has one fault: the berry is always white on the end. But the plant bears a few very fine berries indeed.

Mr. Beadle.—Do you cultivate yours in hills?

Mr. Arnold.—No.

Mr. Beadle.—Then you will never get any crop.

Mr. Arnold.—I think a strawberry ought to take care of itself.

Mr. Beadle.—How did Bright Ida succeed this year?

MR. ARNOLD.—As I said before, no strawberry succeeded well with me this year.

MR. BUCKE.—What do you call your number eight?

MR. ARNOLD.—That is the Alpha.

MR. SAUNDERS.—Mr. Honsberger is in the room I believe. If so, I would like to hear from him about the Early Canada.

MR. HONSBERGER.—This is the second year that I have fruited it to any considerable extent. Last year I fruited an acre of it, this year four acres, and I have found it to do very well. It has not done near as well this year as it did last on account of frosts and other things. There appear to be quite a number of crippled berries; and there has been so much wet that the berries have been soft, which is a fault that all varieties of strawberries have had this year. The Early Canada has suited me very well. Like Mr. Arnold I feel that if I can supply the early berries, I do not care who supplies the late ones; and I have found that with it I have been able to make two or three good shipments before there has been any other strawberry in the market at all.

MR. DENTON.—How does that compare with the Wilson?

MR. HONSBERGER.—Last year I grew the Wilson and the Early Canada side by side, and the Early Canada yielded a bigger crop than the Wilson. We had them seven or eight days before the Wilson last year, and picked them two or three days after. The plants were the same age, received the same cultivation, and were in the same soil—sandy loam.

MR. PRESIDENT DEMPSEY.—What other varieties have you?

MR. HONSBERGER.—At present I have none but the Early Canada. I have been growing a large number of other varieties, but the most of them would come in too late to suit me. I was very much impressed with the Charles Downing. I came to the conclusion that that would be more profitable for me to grow than the Sharpless on account of its ripening earlier than the Sharpless. It was not so large as the Sharpless; but it would ripen up uniformly. I found the Connecticut to be profitable on account of its lateness.

MR. SAUNDERS.—More so than the Dominion?

MR. HONSBERGER.—I do not know that they were more profitable than the Dominion. As a rule the Dominion is too soft for shipment, though I have shipped it as far as Montreal. For a late berry for a local market I like it well and have done well with it.

MR. GOTT.—There is one variety—there are two varieties, I might say, that have been developing in our neighborhood this year, and are giving us great satisfaction. One is called the Duncan. It is a very excellent fruit and ought to be very profitable. Another new variety, called Warren, is going to give us great satisfaction. It is inclined to be soft, but it is going to be very profitable.

MR. BEADLE.—I do not grow strawberries for market; I grow them for the plants. One variety which Mr. Smith speaks of as planting for market—the Glendale—I notice is very disparagingly spoken of by others in articles I read; and I was just comparing in my mind what they say with what Mr. Smith says. What they say of it is that it is a very tart berry with very little flavor—one which is rather soft for long shipments. Perhaps Mr. Smith will set us right about it.

MR. A. M. SMITH.—I have the berries here. (Mr. Smith produces a sample of the variety in question).

MR. BUCKE.—Mr. White of Ottawa grew last year several varieties of strawberries, and he found the Crescent seedling was the best—the most profitable—yielded the greatest number of berries; and it is the only one that has really stood the winter with him. But I think it requires some other berry to grow near it, because there is not sufficient pollen on the berry to fertilize it.

MR. A. M. SMITH.—I think the Glendale will speak for itself. In regard to being a solid berry for shipment, I would only recommend it as a late berry.

MR. WELLINGTON.—I am like Mr. Beadle; I do not grow for the fruit as much as for the plants. Still, at the same time, I have some opportunity of testing them. Unfortunately last season the grubs got into our plants so badly that many of the new varieties that I thought we should have raised for the first this year got eaten up. The Manchester and the Bidwell I had hoped to be able to speak of from experience, but I cannot do so. I think the Sharpless is a profitable berry. I found in Toronto this season that

while other berries were bringing 15 cents a basket the Sharpless were bringing 40. Of course you can only get such prices in large cities. I notice that the Triomphe de Gand is being sold at from 30 to 40 cents a basket, while the other varieties are almost done in the cities. I believe the Early Canada is a berry that we shall hear more favorable reports of each year. I believe it is a berry that will commend itself on account of earliness. One of the main points with men who are growing berries for profit is earliness. Even if it is inferior in quality, the early berry will sell well.

MR. BEADLE.—Have you fruited Captain Jack?

MR. WELLINGTON.—Yes, Captain Jack is as productive as the Crescent; if it were possible I would say more so. It is of good, uniform size, a good grower, and, I think, a good shipper. The Duncan is a good berry—very good appearance—even—good flavor, and, I think, a good shipper.

MR. PRESIDENT DEMPSEY.—We have a large collection of varieties of strawberries. With respect to the Duncan, we have it growing in company with a large number of varieties, and allow me to say that it is very productive. It produces apparently more berries than foliage. The berries literally hide the foliage. It should, I think, have high culture, or rather pretty strong land. The Sharpless is just the opposite of that. It produces a large amount of foliage. We have a Sharpless setting very near the Duncan and the first year we fruited the Sharpless it was on very strong land—garden soil. We expected to get berries near the size of a man's fist; but we failed to get any berries at all. We removed the plants afterwards to poorer land, and we find that the Sharpless is now giving perfect satisfaction. I would hate to throw it away. I believe it is going to be very profitable. It commands very high prices in the market; nearly double what the Wilson or almost any other variety will. I admit the truth of what Mr. Arnold said—that it has almost always a green end; but almost anybody who has any pride about him in picking strawberries puts that end down (laughter). Last year we had done up a few cans of every variety of berry we grow for the purpose of testing them, and next to the Wilson stood the Sharpless. I do not know which I would put first. There are several varieties of strawberries that are very much praised which I would never advise you to can. I have not the names with me. We plant largely of Wilson's Albany, and intend to until we are satisfied there is a berry more profitable than it. We have planted this year very extensively of the Crescent seedling. Invariably we plant it with the Wilson—two rows of Wilson and about six of the Crescent. I planted the Early Canada last spring. We never planted it before. We planted the Wilson's Albany at the same time. We also planted the Bidwell at the same time; and the Bidwell produced a few berries. The Early Canada produced a very nice crop for the first year's planting, and the Wilson's Albany also produced a very nice crop—just about an equal quantity—and I could not tell the difference between the flavor of the fruit. And I believe I would be considerably troubled to tell the difference between a basket of the Early Canada and a basket of the Wilson; but the Early Canada appeared to be a little earlier than the Wilson. The Bidwell matured with the Early Canada. I do not think the Bidwell is going to be a firm berry for shipping; from what I saw of it I thought it was soft. I thought last year that Arnold's Pride was the most profitable berry that we had on our ground. I think Mr. Arnold remembers me saying that I thought we could pick it with a scoop. I never saw so many berries on my plants as I saw on those. But this spring the plants were dead. The blossoms were not killed, because the plants were killed before them. It was a very severe winter, however. The other three varieties of Arnold's have stood the winter well.

MR. ARNOLD.—Was it growing beside any others? Was there anything peculiar in the ground?

MR. PRESIDENT DEMPSEY.—To the one side was the Great American, and to the other side, I think, was the Glendale. There were only some two or three plants that survived. But you could not judge of strawberries from last winter.

MR. A. M. SMITH.—I had Arnold's Pride planted with the other varieties and just adjoining the Bidwell. And the foliage came out as healthy—in fact ranker—than that of either of the others right alongside of it. I have fruited the Bidwell; but I hardly know which it is. I sent to Mr. Lyon, President of the Michigan Horticultural Society,

for the Bidwell plants a year ago last spring, thinking that as he was the originator of the variety I would have the Bidwell sure if I got the plants from him ; but to my surprise there are four different varieties of berries growing on the same plants. I think I can tell from the cuts what the Bidwell is ; and there were not any of what I took to be the Bidwell as early as the Early Canada, though they were perhaps a little earlier than the Wilson.

MR. ARNOLD.—I never like to speak of varieties that have only been planted one year ; but the idea that has crossed my mind when I have passed by the Bidwell is that it bids well for runners and nothing else. There is no fruit on it in comparison with the others ; but the runners are immense. I think that New Dominion has hardly got its due. A few hours before I came away from home I picked it with several other varieties, and a more showy box of berries could not be seen, and no white ends as in the Sharpless. And as for cooking, it is one of the best berries I know.

MR. BUCKE.—I do not think strawberries ought to be cooked at all.

MR. ALLEN.—(Goderich).—We have several large growers ; but they stick to the old Wilson ; you cannot turn them from it. I noticed this year one of the growers left one patch of the Wilson to ripen better than he usually does. It is a notorious fact that the Wilson is pulled too soon ; and I do not wonder at the complaints in the city markets of the poor quality of the berry when it comes to the table. It is pulled before it is ripe. They do not wait until it assumes that dark hue which is natural to the berry when it is properly ripe. We grow the Crescent seedling and the Sharpless, and the great point against the Sharpless is just what Mr. Arnold has stated. In every other respect it is a fine berry. The Triomphe de Gand has been a great favorite with us, and is still a favorite. We have one dealer who grows that and nothing else. He grows it just to supply the local markets around there. It will not ship a great distance. The Bidwell has been grown around there a little, but I have not heard anything of it.

MR. BEADLE.—What was the result of allowing those Wilson's to get ripe ?

MR. ALLEN.—He told me the result was that he got more in the local market.

MR. PRESIDENT DEMPSEY.—If he sent girls out to pick the Wilson, how would he manage to have only those picked which were perfectly ripe ?

MR. ALLEN.—Of course that would be a difficulty. He had to watch the bed.

MR. EDWARDS—(Belleville).—The Wilson is the berry I have made the most money out of, and I have tried a great many.

MR. PRESIDENT DEMPSEY.—In this section of the country there are a great many persons cultivating the Colonel Cheney. It is a very profitable berry if you have plenty of soil and the soil is pretty rich ; but be very careful if you can to prevent wet weather coming on at night during the time you are picking them.

MR. BEADLE.—Don't you find the Colonel Cheney is very deficient in pollen ?

MR. PRESIDENT DEMPSEY.—Yes.

MR. SAUNDERS.—I have been growing the Colonel Cheeney during the last three or four years beside the Wilson and Sharpless, and I think on the whole it gives us better crops than they did.

MR. BEADLE.—But you have plenty of pollen from the Wilson. The Colonel Cheney is almost a pistilate variety—there are some anthers on it—and would require some other variety to fertilize it.

MR. WRIGHT.—I have grown the Colonel Cheney ; but I always plant it between the Triomphe de Gand and the Wilson's Albany, and then I have no trouble at all in growing it.

FERTILIZERS FOR SMALL FRUITS.

A discussion on the question, "What are the most desirable and economical fertilizers for small fruits," was then introduced by the reading of the following paper by Mr. Bucke :—

Gentlemen : Having been requested to read a paper on the most economic fertilizers for small fruits, I may state that any manure is suitable for these plants that is adapted

to the soil on which they grow. The only small fruits which require special fertilizers is the strawberry, which does best by a treatment of bone-dust and ashes, or phosphates. The ordinary barn-yard manure, being apt, especially if too largely applied, to make the plant run to leaf instead of fruit.

I have indicated above that the manure should be suited to the soil, as much as to the plant grown upon it, and as this is one of the fundamental principles of vegetable growth, a few remarks on the treatment of soils, and on plant life, may be more interesting than a disquisition of special fertilizers.

I believe the discovery of the remarkable power of the absorption possessed by arable, that is cultivated soils, is generally attributed to Baron Liebig, the great modern German agricultural chemist. It is now demonstrated that the food of plants cannot exist for any length of time in solution in the earth. It is therefore certain that there cannot be a circulation of such solution towards the roots, these must go in search of food. Hence it is necessary, if it is wished to arrive at an adequate idea of the requirements of plants in the shape of nutriments, to study the growth and ramification of their roots.

If therefore the food of plants is not held in solution in the ground it will easily be seen that those portions of the soil traversed by the numerous rootlets will, to a certain extent, be exhausted of its plant-sustaining elements, whilst the immediate adjacent portions, where no roots have penetrated, are rich in them. Should it be necessary to grow a succeeding crop of equal value in all parts of the same field, it will be necessary to mix the exhausted and unexhausted particles of the soil by mechanical means, and to add certain manures or other chemical compounds, to supply what has been removed by previous crops. In order to do this properly it is necessary for the cultivator to understand the nature of his soil and sub-soil.

In the upper surface of the soil are found all the required elements for the production of plants to supply the wants of man and the animals that subsist on them. These elements are accumulated by the absorptive power of soils, and it is this absorptive power which removes from solution the soluble salts required for the fertility of the soil. For instance, it is well-known that charcoal, as an absorbent, is used in most filters, and in the same way animal charcoal is employed by the sugar refiners. Arable soil is found to possess the same properties, though in a less degree. Diluted liquid manure of a deep brown colour and strong smell, if passed through arable soil, will be found to flow off both colourless and inodorous. Not only does it lose its smell and colour, but the ammonia, potash, and phosphoric acids which were held in solution are almost, if notquite withdrawn.

The fertile particles which are attracted to the soil through which they were passed with the fluid in which they were held in solution, is that upon which all plants feed. I may remark, that in using the word attraction, it is perhaps best to explain that it is not used to mean that sort of attraction which causes the needle of a compass to point to the north, but merely a chemical affinity which the soil has for particles which form food for plants.

It is by the vital process of vegetation that the stems and leaves of plants are formed by the food the plant feeds upon. All the foods for the support of plant life are formed in the mineral kingdom. The cosmical conditions of vegetable life are heat and sunlight. The gaseous elements which are absorbed by the leaves of plants are in continual motion in the air. The co-operation of the cosmic and chemical conditions, form the perfect plant. I merely make these brief remarks on the action of manures on soils and the growth of plants, so that some idea may be had as to the way plants are acted upon by artificial stimulants which are given to the soil by the cultivator. In a paper of this nature I must necessarily be brief, as it would take up too much time to point out the attractive force of different soils. It may be laid down as an axiom, that the power of a soil to nourish cultivated plants is in exact proportion to the quantity of nutritive substances which it contains in a state of physical saturation; but all soils will not, and cannot, be made to retain these substances in the same degree, as they have not the same absorptive requirements.

For instance it will be found that a loose sandy soil, and a heavy clay one, possess the absorptive power in the smallest degree.

One of the principal requirements of the fruit grower is to know the cause as well as the means for making the nutritive substances of the soil available for doing their work.

The presence of moisture, heat, and the free access of air, are the best conditions under which the nutritive substances can be put in a fit condition to be absorbed by the roots of plants.

A certain quantity of water, with the aid of carbonic acid decomposes the silicates and makes the undisolved phosphates soluble through the soil—but stagnant water on the other hand excludes the access of air and prevents the generation of carbonic acid—so that it will be seen manures are much assisted by having the soil in a fit state to receive them.

In examination of the question as to the best or most economic manures for small fruits, I have come to the conclusion, the best manure for the soil the cultivator has to work upon, is the solution to the question; as any soil which will produce good vegetables or good farm crops, will produce good small fruits. For these, as well as for the production of any other part of the vegetable kingdom, the earthy phosphates should not be lost sight of in imparting productiveness to land.

The so-called superphosphates are phosphates which have been treated with sulphuric acid. On land, poor in clay and lime, the superphosphates are specially suitable. But on chalky soils, free phosphoric acid and sulphuric acid are at once neutralized, thus depriving them of their essential properties, which are their ready diffusibility, as it is this which renders them so valuable as a manure for other soils.

Amongst the natural phosphates, bone-dust holds the first rank, and probably the best mode of reducing bones is, to expose them to a high pressure of steam, under which they lose their toughness, and swell up into a large gelatinous mass which, when dried, may be readily ground to a fine powder. In this form the bone mass spreads rapidly through the soil, and dissolves slowly with water without requiring any other solvent. Bone charcoal of the sugar refineries makes an excellent manure, but requires to be ground to an exceedingly fine powder to be available. It is a good plan to mix the bone-dust with farm-yard manure, and let the whole mass ferment, when it should be immediately transferred to the soil.

Manures, as a rule, are still on trial, both on this continent and Europe; but the question has long been settled by the Japanese husbandmen.

The soil on the mountains of Japan is composed of a fine brown clay, that of the valleys, a black, loose, deep garden mould. The clay strata of the mountain, owing to the copious rain-falls, give rise to innumerable springs, which may easily be collected without any great skill, and turned to account for purposes of irrigation.

The hills, with their rock strata, about Owen Sound, which I saw during our drives at the summer meeting there last year, put me in mind of the springy hillsides as described in Japan. In that very flourishing empire, the climate of which is very similar to Florida in the United States—the warm summer months are employed for growing rice, sugar, and cotton, whilst during the cooler season of winter wheat and vegetables are grown.

Whether the present fruitfulness of the soil in Japan is simply the product of cultivation extending over several thousand years, or whether its fertility existed from the beginning is not material, the clay of the diluvium, the mild climate and abundance of water, give all the requisites for a thriving cultivation, and these advantages have all been turned to account by this industrious, ingenious and sober people. The Japanese have thoroughly mastered the difficult task of maintaining their land in the highest state of cultivation. Society is divided into seven classes in that country, and the sixth, or lowest but one, is the farming class. There are no agricultural schools, societies, nor academies, and no agricultural press. The son learns from his father, who, in his turn, learned from a previous generation. The system of agriculture in Japan is a positive knowledge, which ages have shown to be true, and there is nothing else to be learned in it.

One of the peculiarities of Japanese husbandry is, that their religion—Sintoism and Buddhism—forbids the eating of flesh, and not flesh alone, but everything derived from animals, such as butter, milk and cheese, thus disposing of the principal objects for which cattle are raised in Europe. Even sheep would not pay, if reared for the wool alone. The consequence is, the whole empire is arable land, there being no pastures, and all the

manure produced, with the exception of the ashes derived from burned straw and refuse vegetable matter, must pass through the human system before being returned to the soil. The dense population, and the small holdings, which consist of farms of from two to five acres, require the utmost care and attention of the cultivator, to secure the greatest crop which it is possible continuously to raise from year to year. As no cattle are used, all the cultivation has to be done by hand.

The manure is carefully collected and stored in large earthenware tanks, of a capacity of from eight to twelve cubic feet. These are let into the ground nearly to the brim, and during rain are carefully covered, but are exposed to the heat of the sun. The only mixture added is water. When the tanks are full, having been intimately mixed from time to time by stirring, it is left, according to the state of the weather, to stand from two to three weeks longer, or until required for use; but under no circumstances is it ever used in a fresh state. Collections of manure are made from every available source, and the towns are carefully explored, to give their quota to the rural districts. Thousands of boats may be seen early each morning loaded with high piles of buckets, full of the precious material, returning through the various canals, which extend far into the country.

Besides this mode of conveyance, in the evening long strings of Coolies are met on the road, having in the morning carried their produce to market, and are now returning to the country laden with two pails of manure each. Caravans and pack-horses which have brought fine manufactured articles, such as silk and lacquered goods, a distance of two or three hundred miles, from the interior to the capital, return freighted with baskets and buckets of manure. By this means a perfect circulation is kept up of the forces of nature, and no link in the chain is ever broken.

In Japan, manure is applied in a liquid state to the growing crops, and no crop is grown if a suffieient quantity of manure is not at hand to fertilize it with. If the life sustaining principle is not in the cultivators tank the crop is not sown. In this and all European countries the grain and other products are brought to market, but nothing to compensate it is returned, consequently the force to produce eventually gives out, and production is reduced.

Under the Japanese system of agriculture one would suppose the crops would be of an exceedingly luxuriant character, but such is not the case. There is nothing extravagant in the appearance of the Japanese crops. But what does distinguish them most, as compared with our own, is the certainty and uniformity with which they have been produced for thousands of years. If facts are required to prove this assertion, it may be stated that the empire covers a similar area to that of the British Isles; but owing to the hilly nature of the country only about one half is fit for cultivation. Yet they have a larger population than Great Britain and Ireland, and still they maintain themselves without obtaining food from other countries, as is the case with the United Kingdom, which imports many millions of dollars worth, in the shape of meat and breadstuffs, etc.; and since the opening of its ports, Japan is actually exporting large quantities of food.

In Japan all crops are grown in drills, which are so arranged that, during the same season several crops are produced from the same piece of ground. For instance, in the middle of October a field of buckwheat will be found planted in rows of from twenty-four to twenty-six inches apart, the intervening, now, vacant space had been sown previously with small white turnip radishes, which have already been gathered. This space is now being tilled with the hoe, as deep as is possible, by the implement employed. A portion of the fresh earth is raked from the middle of the row up to the buckwheat, now in full flower. A furrow is made between the rows in which the gray winter pea is sown, the seed is then manured and carefully covered with soil. By the time the peas are two inches high the buckwheat is ready to cut, a few days after the rows where it stood, are dug up and sown with winter wheat or turnips. Thus crop follows crop in grand and endless procession, month after month, and year after year, as there is no season which is not suitable for the growth of some sort of produce. If however, there is a deficiency of manure, the interval is left fallow. What wonderful ingenuity and appliances would it require in this country to keep up such a strain on our soils? Yet, these half-civilized creatures, which our most enlightened chemists and cultivators would look down upon with contempt, have solved the whole problem of supply and demand, keeping their land

in the highest state of cultivation, without in any way exhausting it, *and with only one kind of manure.*

The Japanese system which, it will be seen, is much assisted by the climate, prevents the manure from lying idle for any length of time. There is no doubt the row system, whether applied to fruit, garden or field culture, is the proper course to pursue for all kinds of cultivation, and where this plan is followed the soil should be made mellow, and turned several times with the digging-fork during the growing season of the crops.

It will be seen by the above remarks that the application of manure alone, although a very important factor in the growth of plants, is not the only thing required in raising a perfect crop. The aerating and mechanical manipulation of the soil, so that the rootlets may be prmitted to pass easily through the soft earth in search of the vital forces of nature, are quite as essential as plant food. The conditions described cannot, under the present system of ploughing, harrowing, and cultivating, be attained in any degree of perfection, as the soil requires to be acted upon in a rotary instead of a longitudinal way to give the required seed-bed an after treatment, and I believe that when steam cultivation, which is in the near future, is employed, it will revolutionize the working of soil in quite as great a degree as the spinning jenney, and the sewing machine have changed the old methods of making and working up fabrics. A time also must certainly come when some convenient and easy method will enable the more civilized nations to secure and employ effectually the forces of nature, which at present seem to waste, rendering our rivers and streams impure and unhealthy. When that day arrives, a balance will be found in the laws of supply and demand for the requirements of land which will have the effect of making our globe a much larger and more fitting sustaining power for the human race than has ever been dreamed of by Malthus, or any of the old world philosophers. The economic application of steam to agriculture will give largely increased crops at a minimum outlay, as the expense of horse-flesh, horse-feed. and men to attend and care for them, is like fences, a tax on agriculture which few, who have not looked into the matter, would care to contemplate. Without being much of a prophet, I venture to predict, that though the present century has not many years to run, it is altogether probable its crowning and greatest invention will be the application of steam to husbandry.

MR. ARNOLD—I would like Mr. Bucke to tell us which are the best manures that are manufactured in the country.

MR. BUCKE.—Well, I say that superphosphates are good for strawberries.

MR. BEADLE.—I spent about thirty dollars for a ton of superphosphates made in Guelph, and I tried it on a great variety of things—carrots, onions, strawberries and corn, and I thought it was of about as much value as so much sand. It was not worth the labour of putting it on. A neighbour of mine tried some that was made in Boston (Bradley's Superphosphate), and I must say that where he applied it, it seemed to have stimulated everything he put it on to a most magnificent growth. Why there was this discrepancy between the phosphate manufactured in Guelph and the phosphate made in Boston I cannot tell. His strawberry crop, where he applied Bradley's superphosphate, was certainly very fine, but no better than I have seen produced by the use of common barnyard manure mixed with bone dust. I believe if we would take ground bone and make our own superphosphate out of that we would save a good deal of money which we now pay for gypsum and sand which are put in to make up weight. I believe we are humbugged most egregiously by these patent manure makers. I was told by a member of this association that we could make our own superphosphate if we would put bones in a barrel and cover them with plaster of Paris or ashes and then wet them thoroughly with potash. By that means you will get the bones soft so that they will mix up with anything that is added to them. I have never tried the experiment yet, in the way which Mr. Gilchrist (that is the gentleman's name) mentioned, and I give it to the society today in order that members may try it. I think we can grow more and larger fruit by the use of superphosphate than we do now.

MR. PECK.—Will Mr. Beadle be kind enough to give the quantity of ingredients necessary?

MR. BEADLE.—Mr. Gilchrist did not give me any particular quantity; he just said to put enough gypsum in with the bones to cover them, and then pour in your solution of potash, enough to thoroughly wet it. The action of the potash on the bones would dissolve them.

MR. CARR.—Has anyone tried diluted sulphuric acid?

MR. BEADLE.—Yes, diluted sulphuric acid will dissolve bones.

MR. DRURY.—I think if an experiment were made by some person with the different manufacturers of artificial manures, applying them on the same soil and under the same conditions, it would be more satisfactory than to have different persons trying them under different conditions on different kinds of soil. We are all aware that with common land plaster different results will be produced on different kinds of soil. I am not so sure as the Secretary seems to be that the Guelph superphosphates is a fraud. These high priced manures are very often a fraud, I think; but I am not satisfied that an experiment which is conducted without due regard to the details should be taken as conclusive. My experience in this matter has led me to think there is something behind all this diversity in results that we have not got at yet—in the use of these artificial manures especially. I know perfectly well that in growing clover some years the investment of money in land plaster is a good one and yields a very fair return; and then other years it is used and no result is produced at all.

MR. WRIGHT.—Several of our customers wanted us this spring to bring in some superphosphate, and we brought some from Brockville and sold to them, and as yet I have not found one of them who has observed any benefit from it. I have some two or three boys in the village to whom I give twenty-five cents for every barrel of bones they bring to me. I put these bones in barrels and cover them with water and ashes, and it is not long before they are perfectly eaten up by the ashes. In that way I get splendid manure —just the thing for my roots and small fruits.

A MEMBER.—Tell us how you apply it for melons.

MR. WRIGHT.—I put in the seed first, and then cover it with muck, and then put on the bone dust. I keep the bones over from one season to another—about nine months.

MR. BUCKE.—The Boston phosphates are not nearly so good as the Canadian phosphates. They mix our Canadian phosphates with their best phosphates. There is no better phosphate anywhere than there is in Canada.

MR. SAUNDERS.—I think the main objection to the Guelph phosphate is that it has too much sand in it. I was one of the judges on this subject at London; and I put a magnifying glass to that phosphate and could make out the grains of silica in it. I asked the man how the sand got in it, and he could not tell me. He said his boss could; but I never got any explanation.

MR. ARNOLD.—I am inclined to think there is something in these phosphate mines. I noticed Mr. Brown, the manager of the Guelph farm, speaks in one of his reports very highly of these Brockville phosphates; but he has not a word to say in favour of Guelph so far. I fancy he discovered the sand as well as the rest of them. There is a great effort made by these Brockville people to introduce their phosphate, and they sell it in our locality at five dollars a barrel. I put bones in my manure heap with ashes above and below them, and I found in the course of a few weeks that it was a very nice paste. I thought it was a very nice manure; but I could not say what the results were.

MR. DRURY.—There is a source of manure that I think is neglected by our farmers to a great extent throughout the country, and that is a cistern near the barnyard to receive the drainings from the manure pile. I noticed when in England that every well regulated farm had such a cistern. The contents are taken out regularly, and by an arrangement similar to what is on a watering cart is sprinkled over the fields. I have used such a cistern, and I find the best results from it. During the last two years I had a very good opportunity of observing the way this waste was going on, having seen some of the best farms throughout the western part of this Province; and I noticed only two farms where there was provision made for avoiding it. I believe that if we collected this

manure and applied it most of us would find that we had in it a supply almost sufficient for our wants, especially so far as the garden and orchard are concerned.

MR. PRESIDENT DEMPSEY.—I have experimented a little with these artificial manures. One year not many years since we used three tons of the Canadian superphosphates—the mineral superphosphates from Brockville, and I could not see any practical result from it. The season proved very dry, and the phosphate was applied a little too late, I thought. However, I fancied I did see a marked result on the crop of the following year. I never saw fit since that to invest thirty-five dollars in that quantity of manure. I thought it was too much money thrown away. Some years ago we used to collect all the bones we could and break them up a little on an anvil with a stone hammer. It was something like work, however, to do it. We diluted one part of sulphuric acid with three parts of water, and that would dissolve the bones in the course of a few days. That we mixed up again with perhaps double the quantity of bones, and one barrel of it was worth five of this superphosphates we got from Brockville. I tried the first superphosphate which was manufactured by Cole of Montreal, and it gave me the best results of any superphosphates we have tried yet. That was a number of years ago. I have tried some that was manufactured by P. R. Lamb of Toronto, and invariably we have had good results from it. After a time Mr. Lamb adopted the idea of mixing part bone superphosphates and part mineral superphosphates—and there is a good deal of sand about Toronto too. Let us bear in mind that so long as a barrel of bone dust weighed 150 pounds it was all right, but, just as soon as we found the weight of a barrel of bone dust get to 250 pounds, it ceased to be worth the same amount of money. When you get a barrel of bone dust that weighs more than 150 pounds, you are paying for something besides bone dust. There are advertised now small mills for crushing bones. If we could get something like that, we would soon be able to dissolve the bones with hardwood ashes. I have never seen one of those mills. I have produced large pears by means of artificial manure, and sometimes won some prizes through the use of it; but that manure was nothing more nor less than sulphate of iron dissolved and applied to the soil in a liquid state. If you feel a little too lazy to do it in that way, pulverize the copperas and sow it over the soil. We sow four or five pounds around a tree. When we apply it in a pulverized state it does not all dissolve at once. If we use it in a liquid state, we are a little more cautious. In experimenting with these artificial manures a few years ago we cultivated peaches, pears and apples in boxes, and, having in this way perfect control over our trees, we could readily observe the effect that the manures had upon the growth of the trees, and we found that nothing gave as much satisfaction in the case of the pear as sulphate of iron. I remember showing a Belle Lucrative pear to Mr. Barry of Rochester, and he could not recognize it. It was grown all out of form. Finally he asked me what it was. I said it was a Belle Lucrative. "My dear sir," he said, "if you can grow such Belle Lucratives as that in Canada, grow all you can of them." I grew Josephine de Malines also in that way. Josephine de Malines can be recognized by anybody, and he recognized it, but he did not know how I could produce such a pear. It was produced in just the way I have stated—with copperas water.

A MEMBER.—Have your trees blighted any since you commenced to use that?

MR. PRESIDENT DEMPSEY.—I do not remember seeing any trees blighted since I commenced using that. You will pardon me, however, if I do not propose any remedy for pear blight. We have tried for strawberries bone dust, superphosphate and ashes separately, and we have tried the whole three together, and we have tried two of them together, and we have had just as good a result from common wood ashes as we have had from the whole of them, or from any one of them, or from any two of them combined.

MR. BEADLE.—Will it pay to buy potash and water your strawberry plants with that?

MR. PRESIDENT DEMPSEY.—No; it will never pay a man to buy potash, so long as he can get ashes for ten cents a bushel.

MR. BEADLE.—But we cannot get them for less than twenty-five cents a bushel.

COL. MCGILL.—I find that one of the strongest manures that I can use is five parts of mould to one of hen manure, with one part of roasted lime to loosen the hen manure. You have got to be very careful what quantity you use, because it is almost, if not quite, equal

to foreign guano. I think, if we can get hardwood ashes at ten cents a bushel, it pays better to use that than any of the artificial manures.

MR. PRESIDENT DEMPSEY.—We have been advising the Government of Ontario to establish, in connection with the Agricultural College, a laboratory, which would enable them to analyze any fertilizer which we might see fit to purchase; and if that recommendation is carried out, I do not see why we should not be willing to send them a sample of any manure we might buy at any time, and if it did not come up to the claims of the person selling it, I do not see why we would not be justified in prosecuting him, just the same as we would a person who should sell us a barrel of flour which was partly made up of sand.

MR. BEALL.—I was reading an article on artificial manures lately, which I am sorry I did not read more carefully, it bore so nearly upon this matter. It was written by a gentleman in England. He said that superphosphates, as well as all others of those patent manures, if they were honestly put up, were pretty much what they were guaranteed to be—that is, they would all have the good effects promised for them by the persons getting them up. But the great difficulty was in the farmer not knowing where to apply them. He went on to say that probably three fourths of all the artificial manures which were applied in England were put upon soils which did not require those particular kinds of manure. There is no doubt that from this time forth a man, to be a successful farmer, must understand the chemistry of the soil. This writer says that straw is the least valuable of all the manures. He speaks of landlords binding tenants not to take any straw off the land, and says it is the most foolish thing a man can do. He says he can buy manure five times as valuable for what the straw is worth.

MR. EDWARDS.—Some years ago I was thinking of going into the manufacture of artificial manures, and an uncle of mine, who was carrying on the business in the old country, told me, "You can dissolve the bones with common sand, kept moist, just as well as you can with anything else, but it will take longer." He said that it would not pay to dissolve bones with sulphuric acid, unless I could buy it for two cents a pound.

MR. SAUNDERS.—This is entirely different from anything I ever heard before. I cannot understand how sand can do anything but increase the weight.

MR. BUCKE.—Salycilic acid does work on the sand.

MR. SAUNDERS.— But there must be something else with it.

MR. PRESIDENT DEMPSEY.—Persons engaged in the manufacture of superphosphates claim it is necessary they should use something as a precipitant, and they prefer sand, on account of its heaviness.

CULTIVATION OF THE GRAPE.

Colonel McGill read the following paper :—

GRAPE GROWING AT OSHAWA.

In compliance with a request from the Secretary of this Association, I have jotted down some of my twenty-five years' experience in grape growing. I find that good ground, deep and well pulverized, and well enriched with well-rotted barnyard manures, and a south-eastern slope is essential to success. Have rows twelve feet apart, and vines twelve feet apart in the rows. Train vines on the arbor—stake and trellis—like the latter system best. I prune in the fall as soon as the foliage falls. Trim to two buds. Lay vines down just before the ground freezes up; covering vines with a little dirt—let them remain covered until all danger of spring frosts is past. I give my vines clean cultivation, cultivating the ground two or three times during the summer. I give the ground a good dressing of well-rotted barnyard manure, and a dressing of ashes, lime and salt every other year. Don't trim in the summer, except nipping off the tips of the branches that bear grapes, at two or three leaves from last bunch of fruit; this causes new laterals and leaves to grow which is beneficial to the ripening of the fruit. I get my best bunches of grapes where the most foliage is; the more foliage the better the fruit. Have tried

laying the grapes, and think well of the plan. I have twenty-nine varieties of grapes growing on my grounds, eighteen or nineteen varieties are fruiting. Never had any mildew on vines except a little on the Burnet—two years ago had a little on the fruit of the Salem, and Clinton same year, and some on the Clinton last year also. I dusted the fruit and vines with the flour of sulphur, and scattered some on the ground under and around the vines affected. I like Rogers' No. 3, 4, 9, 15, 19, 22 and 43, much, especially 3, 9 and 22; three and nine much alike. Brighton fine, but don't bear well with me. Delaware does well—a nice little grape should be in every collection. The Hartford Prolific does well on my grounds, but drops badly from the stem; there are many better grapes to my taste. The Champion is a fine grower and bearer with me—ripens two or three weeks before the Concord—too acid for me, but sells well on account of its early ripening. Early Dawn—a nice sweet grape and early, I like it much. Worden's Seedling is the Concord over again, but ripens some ten or twelve days earlier, which makes it valuable in a cold climate. The Lady grape, or White Lady as some call it, is a very good grape, but a slow grower—requires the best of cultivation; so do the Delaware and Early Dawn vines. The Croton is a first-class grape in my opinion when well grown, but the foliage is tender and sunburns; is not profitable. Isabella grows and bears well on my grounds, but don't ripen its fruit well only in the most favorable seasons. The Clinton grows good and bears well; I use it for wine. The Pocklington is fruiting this season with me for the first time; it is a strong grower, and bids fair to be a great bearer. Planted the vine last year and it has fourteen or eighteen bunches of blossoms on it. The Burnet grows well on my grounds; has borne a few bunches of grapes for the past three years; is full of blossoms at present. Last year three fourths of the berries or grapes were not larger than small peas—they ripened and were very sweet—what few grapes did come to perfection were very good; I hope it will do better this year. In conclusion, I think, all things considered, the Concord is the grape for the people in this part of Canada.

All of which is most respectfully submitted.

JOHN MCGILL.

MR. GOTT.—I would like to ask the Colonel whether, if he only pinches his main runners once, he does not find the laterals very troublesome—whether they do not rob the fruit of its nourishment?

COLONEL MCGILL.—I pinch more than once; whenever they send out the second growth of leaves pinch again.

A MEMBER.—I did not exactly understand whether the gentleman breaks off everything that does not bear fruit.

COLONEL MCGILL.—No, sir. I do not unless there is an over abundance of leaves. I find the more foliage I can keep on the vine around the fruit the better fruit I can have. One of the secrets of the success attending the bagging of fruit is, in my opinion, in keeping off the hot rays of the sun away from it. In my first experience with grapes I was exceedingly anxious to get them ripe, and I thought that if I could get them colored that was all that was wanted; and in order to get them colored I took the leaves off so as to let the sun get at them. Still, however, I did not get the grapes ripe—I got them colored—they were burned.

MR. BEADLE.—Have you marketed any grapes?

COLONEL MCGILL.—I have.

MR. BEADLE.—Do you believe it to be profitable in your section of the country?

COLONEL MCGILL.—I do. I am satisfied we have to cultivate to please the eye more than the palate. I have sold my Rogers' at from 14 to 18 cents a pound, and one man in speaking of my Champion at the show, said to me, "Colonel that is the best grape I ever ate." I said, "I am glad to hear you say so—but you are the first man I ever heard say that." I think, from my experience, that there is more money in the Concord than in any other grape. I get from six to eight cents a pound for the Delaware.

MR. ARNOLD.—Colonel McGill spoke about the foliage being necessary to the ripen-

ing of the grapes. We all admit that. I want to ask him if he thinks the foliage on the laterals which have no fruit on them improves the fruit on the other laterals?

COLONEL MCGILL.—I leave the foliage on for the purpose of keeping the sun off the grapes. I think it is necessary to have the fruit well covered with foliage.

A MEMBER.—Isn't it a fact that the action of the sun on the foliage affects the grape?

COLONEL MCGILL.—Yes.

MR. LESLIE.—I wanted a little more information from Colonel McGill about the Worden grape. He says the Concord is the grape for the people, and he says the Worden is the same thing over, only that it is eight or ten days earlier. I want to know then why it is not the grape for the people?

COLONEL MCGILL.—What I mean by saying that it is the Concord over again is that, in constitutional and bearing qualities, it is the same as well as in flavour; but it has the redeeming quality of being ten or twelve days earlier on my grounds, and that I consider a very important thing for this country. It is a comparatively new grape in Canada; but should it sustain its bearing qualities and its keeping qualities it should supercede its parent. I think very much of the Worden seedling as far as I have seen. What might do in Leslieville might not do in my grounds. My soil is strong sand loam, highly impregnated with lime.

INVITATION TO A SUPPER.

At this step, Dr. Day, Mayor of Trenton, invited the members of the Association, on behalf of the corporation, to a supper to be given in the evening in the Town Hall, in honor of the Association.

MR. PRESIDENT DEMPSEY.—Mr. Mayor, it affords me great pleasure, on behalf of the Association, to thank you for the very courteous invitation we have received. I trust that we will, one and all, avail ourselves of it.

CULTIVATION OF GRAPES.

The discussion on this subject was then resumed.

MR. PRESIDENT DEMPSEY.—I was not satisfied with the Colonel's explanation. He says the Concord is the grape for the million, and then he says the Worden is the same thing as the Concord, only that it is ten days earlier. If so, I say "Good-bye, Concord." I am willing to endorse what the Colonel says about the two varieties; but I do not want any more Concords when I can have the Worden. We find nothing much more profitable than the Delaware on suitable soil properly cultivated. It is very prolific; rather too much so. One thing that is requisite in the cultivation of the Delaware is that the soil be strong in order to maintain the growth of the plant. It requires more fertilizers than many other varieties do. It is liable to overbear; and we must remember that it is necessary to take off part of the fruit. By observing those two principles we may produce a very fine crop of very fine fruit which will command a fine price in the market, and which will always give satisfaction. But if you allow the plant to overbear it is going to shed its foliage, and the fruit will be small. Some of Rogers' Hybrids are succeeding very well with us, but there are some of them that are failing. You can cut a bunch of almost any of Roger's black grapes, and without the numbers I defy any man no matter how well versed he is in grape growing, to distinguish them. On the vine he can. The people have a great fancy for a red grape in some markets. At other places they want white grapes. So I see no other way to satisfy the public than to grow those three colours. I found last year in the latter part of the season that the black grapes were most sought for. The year before it was next to impossible to sell the black grape, for the reason that they had previously fed themselves with Champion. The Concord I am not going to despise because I think we have something better, but will continue to grow what I have of it. But if we have a grape in the Worden that will mature from

six to ten days earlier in the season than the Concord—and I believe we have—then I fancy it is our duty to cultivate it in preference to the Concord, from the fact that it keeps better when it is ripe. In white grapes I have failed with some varieties that some are ready to make great claims for. One is the Martha. I do not want it at all. It is of very little value. I think Col. McGill was speaking rather highly of the Lady grape. Some people have spoken against it. With me it fruited last year, and I prized it very highly. It looks now as if it was going to be a profitable grape. A good hardy grape is something that we want, and we are at the present time looking forward to getting it. Several of those new white grapes are promising well, but they are yet to be thoroughly tested I fruited last year on my grounds the Pocklington, and it was a very fine grape, but it shed its fruit greatly when it was ripe. You could shake it all off. I saw afterwards, however, some bunches that were sent me by Mr. Wellington, I think—at all events they came from that firm—that had been grown in another place, and they adhered quite firmly to the stem. I am looking forward to that grape as a grape of promise. My mind has been naturally changed with respect to it. I believe that the day is not far distant when the Niagara will be for sale. I do not, however, like the way in which those people are handling the Niagara grape. It looks as if we ought to touch it very cautiously. If the grape is so precious that they wish to continue to place it on trial for a dollar and a half a plant it begins to look suspicious to me. And then they make you take two hundred plants. The more I think about it the less I think of the grape. However, I have been very favourably impressed with that grape. There are some new Canadian seedlings that we should not lose sight of. There are some that are produced by Mr. Haskins, of Hamilton, that, I think, are promising very finely. There are some again that have been produced by Mr. Mills. I think they are all dark, but there are white ones produced by Mr. Saunders that certainly are very promising, and the day is not very far distant when some of them will make their mark. There are some that have been produced by Mr. Reid, of Port Dalhousie, that are very promising. One of them is a very delicious white grape about the size of the Delaware, which, I believe, is destined to make a mark yet. There is another one, a little larger, that looks to me like something very superior. We find that over the country there are several seedling grapes. I have a couple of white ones of my own that give me great satisfaction; one of them, 25, mildews sometimes, and it will overbear. It grows very strong and tall. It ripens late, but there was more money in it on my premises last year than in any two other grapes that I had. It brought higher prices in market. It produces a greater weight than any other variety we have. No. 60 is very early, but it is a small grape. I do not think it will be a profitable grape for market. It will drop from the bunch if it hangs very long. It matures with me pretty near a month ahead of the Concord. You cannot keep it till the fruit is ripe. There are many new Canadian seedlings, and I would recommend that no one be afraid to spend a dollar in order to test a new variety of our own production. Mr. Haskins does not try to make money out of his grapes; yet he has spent days, months and years—we might say—in carefully hybridizing different varieties and carefully fruiting them. He has a black grape at the present time that, I believe, produces better wine than any grape we have yet tested. That is his Abyssinian. It is a grape that I fancy would be very profitable for us to cultivate for market purposes. I rather like the flavour of it. There are some of Mr. Arnold's grapes again that have failed in some sections of the country, but in other sections are succeeding. You will find that in one locality a grape is going to succeed, and in another it is going to fail. The Brighton is a very profitable grape with us. The trouble is that I do not think it would stand to travel long distances to market. But for an amateur variety I do not think there is anything to surpass the Brighton. We have to protect almost any variety, therefore almost any of them are sufficiently hardy for cultivation here. I found several varieties frozen to death last winter, but it was an unusual winter in the lack of snow. There is only one variety that I know of, of which we lost all our vines. Locality has a good deal to do with these things.

MR. MATTHESON.—Is the Adirondac not grown in this vicinity?

MR. PRESIDENT DEMPSEY.—I grow it.

MR. MATTHESON.—What is the objection to it as a market grape?

MR. DEMPSEY.—The Adirondac is a very feeble grower. You have difficulty in getting the plant, and when you get the plant you have to use very great care to get a crop.

MR. MATTHESON.—I find the Adirondac to be quite a thrifty vine, and that it requires no special care more than I give to the Delaware or the Concord. In my estimation these varieties of grapes would probably run in this order:—Delaware first; Adirondac second; what we call in Ottawa the Chasselas de Fontainbleu is next; after that the Brighton; then some of Rogers' varieties—15 particularly, then 43 and 44.

COL. MCGILL.—With regard to the Lady, I like it myself; but we have to remember that we differ in taste in regard to grapes as we do in regard to eating butter and cheese. I am very fond of a sweet grape. As to the Delaware I am aware that it is inclined to overbear. And so of the Hartford. I have taken more than half off my young Pocklington this season. If I can get ten good bunches of grapes I can make more money out of them than I can out of twenty-five bunches of poor grapes when I go into the market. We have not only to prune the vine, but we have also to thin the fruit. I sometimes take the scissors and thin out the berries so as to give them more space.

CURRANTS AND GOOSEBERRIES.

The next question, "Is the cultivation of currants and gooseberries for market profitable?" was then introduced by

MR. BEADLE, who said—I have got a letter from a gentleman who says he is selling his gooseberries for three dollars a bushel. I should think that might be profitable. I do not know how many bushels he could get off an acre; but judging from the way gooseberries generally fruit I think he would get a good many. I should think he would get as many bushels of gooseberries off it as he would of raspberries or strawberries.

MR. S. S. POTTER.—I think you can grow more gooseberries to the acre than you can of any other fruit you can grow. We get from five to seven and eight cents a quart for them.

MR. CROIL.—Our friend Mr. Tait told me last year that he got 60 cents a gallon for his.

MR. A. M. SMITH.—They are quoted at from five to eight cents in the Toronto market.

MR. BRISTOL.—I saw them selling in Picton market on Saturday at seven to eight cents a quart.

MR. WELLINGTON.—Houghton's are selling in Toronto at present at eight cents by the basket. Downing and Smith's go at ten to twelve cents. Whitesmith's have gone as high as fifteen cents. I think from the fact that gardeners around Toronto and large cities generally go largely into the cultivation of gooseberries that they must be profitable. In fact, from conversation with them I am satisfied that they are about as profitable a fruit as they can raise; and the variety chiefly planted is the Downing. Next is Smith's Improved; and in some places they raise the Whitesmith, though it is very liable to mildew. In some sections about Montreal they grow the Whitesmith without any trouble, and then in other sections near Montreal they cannot grow it at all on account of the mildew. I presume soil or locality has all to do with the mildewing. On high, dry ground, as far as I can learn, they do better than where it is low and damp. The first time I ever had it brought to my notice that the Downing mildewed was when a woman came to me with a specimen of it which was mildewed.

MR. BEALL.—I sent a few bushels of Whitesmith's to Montreal this season, and I got $3.35 a bushel for them. I have about 300 bushels of them; but this is the first year of growing; and taking them and the old ones together—perhaps 35 old ones—I think they would average about half a gallon each bush.

MR. JAMES H. PECK.—I raise gooseberries near Belleville—the Houghton seedling, and I have a good general crop each year. I have never had any trouble with them mildewing. The prices we get are from five to eight cents; and I consider that raising

gooseberries is a pretty profitable business. I find that my gooseberries pay me as well as anything I raise, because I have a good crop. They are generally what you would call a round crop each year—not off one year and on the next like apples. Downing's improved have borne very well; but I cannot see the size in the berries. They look to me very like the Houghton's. My English varieties are a failure; they are subject to mildew. The Hon. Lewis Wallbridge has managed by heavy pruning to occasionally escape. They think that mildew comes from moisture, and that if you prune them heavily so as not to have so many leaves on them you may escape. Occasionally a person will succeed, but there is not one that succeeds in twenty, and the foreign varieties are practically becoming extinct.

MR. BEADLE.—In regard to this matter of gooseberries I wanted to say as a fact that near the sea shore, where the sea fogs prevail, the English gooseberries can be grown to perfection; they do not mildew at all or very rarely. But when you go a little inland, away from the influence of these fogs, they mildew as badly as they do here. A gentleman of my acquaintance, ascertaining that fact, made some experiments in the use of salt. He took some grass from his lawn and spread it under his English gooseberry bushes, and then sprinkled it very freely with salt water of as great a strength as he could well get it, and he thought he had succeeded in finding a way to protect them without failure. He did succeed for years; but at last there came a year when they did mildew—I do not know whether it was in spite of his salt water, or whether he had neglected it. He was not at home when I was there, and I had not the opportunity of asking him. I believe that for growing the Whitesmith and the Crown Bob we need here a good, strong, clayey soil. I cannot grow them on my sand at home where I live. They grow small by degrees and beautifully less every year I keep them.

MR. A. M. SMITH.—In the vicinity of Niagara Falls, where they get considerable spray and have a damp atmosphere, they have no trouble in raising English gooseberries. I was told this by the gardener of the late Mr. Zimmerman several years ago; and living within a few miles of there, and being acquainted with the locality, I ascertained it to be a fact.

MR. MATTHESON.—That view is borne out by the experience of a friend of mine at Ottawa, who is in the habit of sprinkling his gooseberries very liberally with water every second or third evening. He grows very fine gooseberries indeed. I have grown quite a number of English gooseberries.

MR. ARNOLD.—Our friend Saunders has several that have resisted the mildew this year, and the other bushes are covered. His berries are rapid growers, but miserable fruiters. They get on the ground. This year we have had more moisture than we have ever had, and my gooseberries generally are worse mildewed than I ever saw them; but Mr. Saunders', standing within two or three feet of the others, have not a bit of mildew on them. They are altogether superior to Houghton's Seedling, or Downing's Seedling, or Smith's Seedling. They are quite superior in size and great bearers. It is neither light sand nor stiff clay they are growing in. Salt sprinkled on the grass will to a great extent prevent mildew. My opinion is that where we can grow the English varieties without mildew they are profitable. But there is no profit in the Houghton Seedling in our section of the country.

MR. WELLINGTON.—I have a new gooseberry, a seedling, that was found in the first place in an old stump of a hickory tree. It was then improved, and it made such a show in the fall that the person undertook to take it up, but only succeeded in getting half a root of it. However, it was saved; and for three years now I have been watching it carefully. It is a gooseberry as large if not larger than the Whitesmith, a deep golden yellow, and a good fair quality; and as for productiveness, it is ahead of anything I have ever seen. It is not for sale yet, and will not be for another year anyway. I think it is going to be a great acquisition. It has never shown any signs of mildew. It is ahead of anything I ever saw for bearing. It is a perfect sight to see on account of the color of the berries.

MR. SAUNDERS.—A berry of that kind will indeed be a great acquisition if it proves to be entirely free from mildew. My experiments have been principally with the Downing Seedling and Houghton Seedling, crossing them with Whitesmith and Warrington

and Roaring Lion and Broom Girl. I have raised, I suppose, three hundred different seedlings, and I have thrown them all out but a few. I have now on exhibition here five varieties that were among the more promising ones, and two of these samples, you will see, have a little mildew on them. I would not like to throw out everything that mildews, because these do not mildew the way the English varieties do. Some of the English varieties mildew in such a way as to destroy the fruit altogether. I have been fruiting these varieties for four or five years, and they have been giving very fair results; but I do not think they will match Mr. Wellington's if it succeeds in the way he says it is doing now. So much depends on soil in the growing of gooseberries that one needs to know what soil you are growing on before you can form an idea of the comparative value of the fruit. I have two seedlings that are very interesting from a scientific standpoint as well as from a fruit-growing standpoint. They are raised from the seed of the wild prickly gooseberry of the country, crossed with the Warrington, one of the best English varieties. [The speaker here exhibited the berry in question to the meeting.] One of these retains some of the characteristics of the parent; and here is another that is perfectly smooth. Now these are both from seed of the same berry. The fruit is uniformly larger than the female parent—the prickly gooseberry—grows with us, and the berry appears to be of good quality. It may turn out to be worth propagating. The berries group heavily. The interesting fact of one parent being spiny and the other parent hairy while one of the offspring is perfectly smooth, seems to upset the theory in regard to the influence of parentage on offspring.

Mr. A. M. Smith.—I saw several of these seedlings growing side by side with Downing and Smith's Improved and the Houghton, and it seemed to me that some of them were superior in size and equal in productiveness to any of those varieties. So that I have wondered why Mr. Saunders did not have them propagated.

Mr. Saunders.—I would like to make a remark about some seedlings I saw at our President's yesterday. He has a number of new seedlings, and I think some of them are fully better than any I have produced, judging from the size. But his are growing on a soil better adapted for gooseberry production than mine are. In our market we can sell the Houghton Seedling for twelve cents a quart, and we cannot get them rapidly enough. I see them ticketed at twelve and fifteen cents a quart in all the shop windows.

Mr. Allen.—We have tried a number of the English varieties; but they have done so badly that we have given them up entirely. We grow nothing now but Downing's Seedling, the Houghton and Smith's Improved. We consider the Houghton Seedling the best gooseberry we have. It is bought up by everyone for preserving, for pies and for every other purpose for which they are used. I have seen spots of mildew on some of the berries here and there, but nothing to hurt the crop. We are selling this season at ten cents retail, and I should fancy from the cropping quality of the bush that it will do well at that.

Mr. President Dempsey.—I am satisfied that the cultivation of gooseberries or currants will pay anywhere. If our soil is not suitable for the cultivation of the gooseberry, it is for the currant. One or the other will adapt itself readily to our soil. There is no difficulty in producing two hundred bushels of gooseberries to the acre. Even at one hundred bushels to the acre, there is an enormous profit in cultivating gooseberries. Mr. Saunders has already told you that they did not succeed well on sand. We have Houghton's Seedling growing on sand that are badly mildewed now. All varieties nearly are liable to be mildewed that are grown on sand. Downing's Seedlings have very little mildew on them. They are very much more free from it than the Houghton Seedling; and I fancy they are more profitable than the Houghton, from the fact that while the Houghtons last year only brought us five cents a quart the Downings brought us ten. I would almost like to repeat here a little of the advice that Mr. A. M. Smith gave some years ago in a paper produced—in Hamilton, I think it was—in regard to the cultivation of the raspberry. He said that no man would receive such a great amount of satisfaction in fruit culture as the man who undertook to produce seedlings among the small fruits. When we commence to produce seedling fruits, we shall readily discern that we have got something superior to the parent. Mr. Bucke will tell you that he has raspberries that are superior to Mr. Saunders' hybrids, although they are a straight seedling from Mr.

Saunders' hybrids. He has raised varieties that propagate from the roots, and varieties that root from the tip. After we once cross their natural habit of reproducing themselves, we may calculate that we shall never get the same thing from the same seed again ; but we do stand a chance of getting new varieties. But I do not think there is anything like money in this—nothing further than the satisfaction. There is no question in my mind that the red currant is very profitable. However, we find that in almost every section of the country there is a difficulty in the way of the saw fly attacking the foliage. The year before last we had a good deal of the saw fly ; and last year, early in the season, before we had fruit, when the larvæ had just started from the egg, we just gave them a little shower of Paris green. It would not take over a pound to the acre at that time, and it killed every one of them. And I would defy you to find any trace of the Paris green when the fruit was ready for marketing. This year we did not find any appearance of the fly until lately. There is no difficulty in selling currants at a very remunerative price, from the fact that they are so easily picked and so easily cultivated. Really the expense of producing currants is merely nominal. I think that two cents a quart would cover all the expense of cultivating them, and half a cent would pick them, and you would be selling them at a profit supposing you only got five cents a quart. In a moist soil they will attain fully double the size that they will in a dry soil. It does not matter whether the soil is clay or sand. We cultivate the Versailles and Cherry in preference to any other for market. Some persons claim there is no difference in quality, but there is a difference in the plant. Then, again, we find the cluster of bunches on the Versailles is very much longer than on the other, and it finishes up with smaller berries. The White Grape is much easier grown than any of these varieties ; but we do not find a person wanting more than a quart or two when we place them in the market, and we find a great many people wanting a bushel or two of the red ones. I never could make any money in cultivating black currants.

Mr. Beall.—I was making a little estimate with regard to the profits of gooseberry raising ; and judging from my own experience this year I am satisfied it is a very low estimate indeed of half a gallon on every bush—say for six, eight or ten years. This is the first year of rearing with me, and I have got nearly half a gallon. Suppose the bushes are put in rows four feet apart, and that the bushes are four feet apart in the row, that gives us 2718 plants or shrubs on an acre ; and at half a gallon of berries apiece, selling at $3 a bushel, we get for them $507 a year per acre. There is less labor in cultivating gooseberries than a great many other fruits that we are growing. They want lots of manure ; there is very little other trouble. With regard to currants, there are two farmers in my neighborhood who always succeed in getting a first-rate crop of black currants, and they are the only persons, generally speaking—the others do not get enough to pay them for the trouble. Last year I went to both these places two or three times and examined them carefully to see what was the reason they succeeded so well, and I found in those two cases that the bushes were put in not more than four feet apart in the rows, and the rows not more than two feet and a half apart ; and the ground is never manured ; and nothing ever done to it except pulling out the long weeds when they cannot get through any other way. Only about a week ago I read in an English paper that a celebrated gardener in England advises that the ground around black currants should never be touched—that the bushes should be cut off every four or five years close to the ground, and allowed to shoot up again. That was exactly the practice of these two lazy persons I refer to. The soil is a rich clay. One of the men told me that one year, five or six years ago, he had a good quantity of stable manure, and he threw it in among the bushes ; but the other never did anything at all. This English gardener advises putting on as much manure as possible, but putting it on the surface and allowing it to remain there.

Mr. Saunders.—When you were speaking of applying Paris green for the destruction of this saw fly you did not mean to apply it in the dry state, of course ?

Mr. President Dempsey—Not at all. In the proportion of about a teaspoonful to a pailful of water.

Mr. Saunders.—I was recently sent a number of eggs of a parasite which destroys the saw fly. I am in hopes we may succeed in introducing them into Canada. Professor Lentner, of Albany, says they are doing their work admirably.

CELERY, CAULIFLOWER AND CABBAGE.

On the question "What is the best manner of growing celery, cauliflower and cabbage, and which are the best and most profitable varieties?" the following paper by Mr. Peck was submitted :—

CELERY.

I have grown celery for my own use only, and am not in a position to give you much information about raising it successfully. I select the best peice of sandy loam, and make it rich with manure, (hog manure is best), and plow under deep, and make furrows with plow four feet apart for the dwarf varieties, and wider for the tall varieties, say five feet, and put the plants in the bottom of the furrows, six inches apart; if the plants are small they should be covered for a day or two, if hot and dry, then hoe and earth up as they grow—about three times during the season. Care must be taken not to earth up when the plants are wet, nor to cover the centre stalk, for if earthed up wet the stalks will grow scurvy; and if centre stalk is covered it is liable to rot and spoil the plant. Care should be taken to keep the stalks of the plants, that is each plant, as closely together as possible. I have tried bleaching by putting a board on each side of the celery, but the celery was tough and worthless. I don't think it necessary to treat of how to grow young plants, as all seed catalogues contain all the necessary information. The dwarf varieties are the best to my taste, and of these I have grown the Sandringham, Boston Market, New Dwarf, French large ribbed, and Carter's Incomparable Dwarf, red. I can't taste much difference between the white varieties—of the red varieties that I have tried none are equal to the white in flavour. I grow the New Dwarf large ribbed principally. and like it the best, as it has less and larger stalks and little or no small side shoots. I cannot say which are the most profitable varieties as I raise none for sale.

CAULIFLOWER.

The cultivation of the Cauliflower is the same as that of Cabbage, which I give below; and as to the best and most profitable varieties to raise, I have not succeeded in raising any variety that was any profit in it, and have quit raising them. When I had them for sale I could sell twenty-five heads of cabbage to one of them.

CABBAGE.

The plants for early must be raised under glass, either in hot-beds or green house,—which is not necessary for me to treat of—I shall therefore give my method of raising later plants; where most people fail on account of the flea. Take a clean piece of moderately rich land, level good with a garden rake, and sow the seed broadcast; if a large amount is required, then rake the seed under going backward, so as to leave the surface level; or, if preferred, it may be sown in drills with a hand seeder, which is the best if it can be had, as more of the seed will come, but care must be taken not to cover too thick—about an ounce, if good seed, is enough for a square rod. Immediately after it is sown sow common wood ashes (dry) by hand all over evenly, about a peck to the square rod; if any flies are there they will leave. Before the plants are up the surface of the soil should be kept moist by sprinkling with a watering pot, if it becomes dry, until the plants are up—they will take care of themselves after that. I have never failed to raise good plants in this way. The next thing, and most difficult, is to select a proper piece of land to set them in—low, flat, loamy ground is the best, even should water stand on it until the first of June, it will not hurt or injure it, as I have my best cabbages on the lowest land—that is late cabbage—the advantages are on such land, (1) no grubs nor maggots to signify, (2), and most important, the ground is always moist. For the earliest planting, land must be selected that water does not stand on; gravelly clay will grow the earliest cabbage, but will not do as a rule for late planting, as it would be too dry. High sandy loam is not good for

early planting, as the cut worm (known here as grey grub) and maggot are worse in such land. One of my neighbours, W. D. Bonter, told me that he lost about all of his early plants on such land this year. It will do for late planting, providing the season is wet enough; in fact cabbage will grow good on any land if kept continually moist and well manured, With our dry seasons I don't think the late or general crop of cabbage can be successfully grown except on low, flat, loamy land, sandy being the best, which should be manured liberally every two years, and should be cultivated and kept clean of weeds before as well as after planting. The land cannot very well be too rich. I have no experience with artificial manures on cabbage. I planted my early varieties 2 × 3 feet, and late 2 × 3 feet; some plant closer, but I could not see anything gained by it, as the heads are smaller. I never water plants when or after setting them out, for if the land is moist enough to grow them they will do as well without watering as with it. I have tested about twenty-five varieties, and prefer Henderson's Early for an early crop, and Filderkraut for later. Henderson's Early heads good, and as early as any that is worth raising, is very tender, and will stand longer when grown without bursting the heads than any I have tested—it will not do for late planting as it will not keep. I have tried the Jersey Wakefield and could never get them as early nor as large as the catalogues speak of. The Winningstadt is a hardy early, and heads as well as any, and sells well on the Belleville market—but they are about the toughest and poorest in flavour of any that I have tested. I was told by a market gardener, while attending the Toronto Exhibition in 1880, that they could not sell them on the Toronto market; Henderson's Early being sold there principally for early. I have quit raising them, as the Filderkraut is just as early, heads just as well, if not better, will produce 50 per cent. larger crop on same land, and the best flavoured and tenderest of all, except the Savoys. They will do for either early or late—mine will be ready for market as soon as Henderson's Early—and they combine about all the qualities necessary for a good and profitable cabbage. The Savoys are the tenderest and best for boiling, and the best keepers if buried, and shrink the most if kept in cellar, but I can't get them to head so as to be any profit in them—they do not sell well on the Belleville market. There is no profit in raising red cabbage with me; I raise a few for to exhibit only. For a late crop about the 1st of July is soon enough to plant the Filderkraut; I am not done planting yet, the 12th of July. Cabbage to keep must be cut when it is growing—if the outer leaves commence to rot before it is cut it will not keep. I have not been troubled much with the cabbage worm since I have planted an acre or more together, which is the best prevention against their ravages. The best and about the only practical remedy to kill them is to sprinkle boiling water on them—the first touch of it kills them—it may be done with a whisk or watering pot. Care must be taken not to put too much on, which is not necessary, as the first touch kills them.

FRANCIS PECK.

MR. JAMES PECK.—When you blanch the plants for winter use do you use sand?

MR. POTTER.—No; we use no soil; we simply put the celery on the bottom of the cellar.

MR. PRESIDENT DEMPSEY.—Have you ever tried the use of water in blanching it—freely applying water at the roots of the celery during the winter.

MR. POTTER.—My cellar is so damp that it does not require any water applied at the bottom of it. The floor is the natural rock, and it is always moist. We used to take in the earth with the celery until last season, but last season we shook off the earth and picked off the coarse outside leaves, and the celery kept better than it did before.

The following paper by Mr. Allen was then submitted :—

CABBAGE, CAULIFLOWER, AND CELERY.

HOW TO GROW THEM, AND THE BEST AND MOST PROFITABLE VARIETIES.

It is gratifying to observe the interest taken in the cultivation of the best and most profitable vegetables to meet a rapidly growing demand. Consumers are beginning to appreciate the difficult task the market gardener has, in his constant struggle to preserve pure varieties, and his efforts to please the taste and tickle the palate by the production of finer varieties in the various classes. It requires as much skill to produce an improved vegetable as a new fruit or flower, and he who succeeds in producing a vegetable that takes first place in its class does more, I believe, for the actual benefit of the mass of consumers than he who produces a new flower.

In order to grow vegetables successfully we must look carefully to the soil as a first and main essential. The soil should be rich and well manured for the production of tender and succulent plants ; a strong retentive loam with a fair proportion of sand is probably the best for cabbages. The land should be deeply ploughed in the fall, and if it is inclined to pack and become hard it should be subsoiled. The surface should be left in as rough a condition as possible in order that the new soil thrown up may be subject to the action of the weather. Plough again in the spring turning under about forty loads of stable manure to the acre. A liberal application of wood ashes will also be found beneficial and have a tendency to destroy the white maggot and other grubs which are so destructive to early planted cabbage and cauliflower. After ploughing, the ground should be well harrowed and smoothed with the back of the harrow, and rows marked out three feet apart.

For early and second early varieties the seed is sown in hot-beds from about the first to the middle of March, and for late or winter varieties in the open air from the middle of April to the middle of May. Some large growers sow broadcast and others in drills. I believe in the latter for extensive cultivation, at least, as the after work is more easily and more satisfactorily performed. The seed should not be sown too thickly. As soon as the young plants begin to break the soil sprinkle the bed with air slaked shell lime, which should be repeated again when the plants are nicely up, to prevent the ravages of an insect generally known as the cabbage flea. This must not be neglected or the entire crop may be destroyed, as these insects are very destructive, and at times very numerous at this season of the year.

The distances at which different sorts require to be planted depend upon the size which they usually attain, and the richness of the soil. The extra early varieties should be planted fourteen inches, the second early sixteen inches, and the late varieties two feet apart in the rows, and from two to three feet between the rows. The extra early should be planted out as early as the season will permit, and the late varieties from about the first to the middle of July.

In planting out, advantage should be taken of cloudy, moist weather, and in placing the plants the soil should be pressed well so as to enable them to take a secure hold of the soil. When the planting out is not done in moist or cloudy weather it is well to shade the plants so as to avoid withering or blighting of the leaves by the sun. I have known some growers in planting out cabbage and cauliflower to make openings, fill them with liquid manure from the barnyard and then place the plants up to the first leaf and draw the soil in compactly. Some use salt brine after the plants take well to the soil, which they claim has the effect of destroying the maggots that infest these plants so often, besides it assists in assimilating the particles of soil together and produces a more luxuriant growth of plant. The brine is made by putting as much salt in a pail of water as will readily dissolve and the soil liberally sprinkled with this.

The after cultivation consists in hoeing and keeping the soil clean. The motto of the successful grower is " stir the soil." Especially is this necessary in a dry season, as

thus the air actually waters the fresh dug soil ; besides when the soil is kept loose and porous the air enters more deeply and this moisture is brought into immediate contact with the roots of the plants. An hour with the hoe among the cabbage plants will do more good than two hours spent in watering.

The cabbage and the cauliflower are attacked by numerous insect enemies. The caterpillars of the cabbage moth do great mischief by eating the hearts of cabbages and cauliflowers, rendering them totally unfit for use. Hand picking and dusting the plants with newly slaked lime are probably the most reliable means known by which these destructive pests can be kept in check. Some use fine road dust, and they claim with good effect. Other remedies have been tried with various results, such as dusting with cayenne pepper, and throwing hot water upon the plants. The cabbage louse proves very injurious also. Slaked lime is probably the best and safest remedy. Another very injurious insect is the one which produces what is known as "club-root." This is the most destructive disease to which the cabbage tribe is subject. It is most generally ascribed to one or more species of insects, maggots being generally found in the tubercles. Lime, wood ashes, soot, nitrate of soda, and common salt are considered to be useful applications to the soil in which cabbage and cauliflower is to be grown in order to destroy these noxious insects. It is also a good plan to dip the roots of plants about to be set out in a mixture of soot and water made of the consistency of thick paint. To this some recommend the addition of saltpetre in the proportion of one pound to every gallon of soot. When setting out, the plants should be carefully examined and any affected in the least should be destroyed. It is claimed that cabbage grown near the salt water is invariably free from club-root, from which I would infer that salt would prove a valuable addition to the soil where the crop is to be grown.

For delicacy and sweetness of flavour we have nothing in the vegetable garden to surpass a well developed cauliflower. But in order to produce perfect specimens there must be no stoppage of growth from the time the plants are set out until the head is ready for the knife. The cauliflower requires a rich soil and an abundance of water. In a dry season unless the plants are watered often and abundantly they will come out of proper form and very loose and spindling in head. In fact it is vain to look for a compact, white head unless there is a rapid and continued growth from the setting of the plant to maturity. Liquid manure should be used freely in watering, and the soil kept loose by hoeing deep. In other respects cauliflower requires the same cultivation and care as cabbage. It is also subject to the same insect enemies.

Celery is becoming appreciated more and more, so that now instead of being looked upon as a luxury it is considered almost a necessity. Nervous rheumatic people find great benefit in a free use of celery both raw and cooked. A light rich and rather moist soil is best adapted for the growth of celery, whilst one which is heavy, wet and adhesive is unfavourable to it. Light sandy loam well manured with cow dung produces good celery, provided plenty of moisture be afforded. Good peat soil, limed and manured will also produce large solid heads. In order to obtain good strong plants for setting out, it is best to transplant from the hot-bed, when the plants are three inches high, to a well prepared bed placing the plants about five inches apart. If well attended to here they will be fine stocky plants in about three weeks, when they can be removed to trenches. The trenches should be prepared beforehand by digging about two feet deep, and working in well-rotted manure and top soil about fourteen to eighteen inches. The trenches should be about four feet apart. The plants can be set six or eight inches apart in the trenches. When planting all straggling leaves should be pinched off and the plants set in firm. The after culture consists in stirring the soil often and earthing up occasionally during the summer, taking care not to allow any earth among the stems for fear of rusting them. The earthing up should be done when the stems are perfectly dry.

Celery suffers from the attacks of the celery fly, which lays its eggs in or upon the leaves and larvæ produced feed upon the leaves forming blisters. The only way of limiting their numbers is by pinching the blisters as soon as they appear, and cutting and burning all the blistered and spotted leaves that can be removed with safety to the plant. Celery is liable to canker in some soils particularly in such as contain much oxide of iron. I have seen celery blanched beautifully by placing a four inch tile over

the plant, and when it grows over the top the tile is raised and supported with earth below

The dwarf varieties can be planted on the surface instead of in trenches, and many growers prefer this method, as the plants have a greater depth of rich living soil below.

So far as my experience has gone I prefer the following varieties of cabbage, cauliflower and celery.

Cabbages, extra early varieties:—Early York, Little Pixie, Jersey Wakefield, and Early Oxheart.

Second early varieties:—Winningstadt, Henderson's Early Summer, and Fottler's Improved Brunswick.

Winter varieties:—St. Denis Drumhead, Quintal Drumhead, Large Flat Brunswick, German Drumhead, Savoy and Green Curled Globe Savoy.

For pickling, Red Drumhead.

Cauliflower, extra early for summer use:—Very Dwarf, Earliest Erfurt, and Extra Early Paris.

Late varieties:—Half Early Paris, Le Normand's large late, Le Normand's short stem, Dwarf Erfurt and Veitch's Autumn Giant.

Celery.—Prince of Wales, Dwarf Large Ribbed, Carter's Incomparable Dwarf Crimson, and Boston Market.

I have tried many other varieties in each class with more or less satisfaction. Henderson's Half Dwarf celery has always been a rank grower, but strongly inclined to grow hollow stems. Among cabbages I have found Winnigstadt upon the whole to be the best. It forms quickly and so close that the worm seldom harms it.

STORING FOR WINTER.—Cabbage for using or marketing in winter should be lifted early in November, or earlier if the weather is threatening frost and snow, as it is desirable that this work should be done in dry weather. Choose a dry piece of ground, dig a trench 18 to 24 inches deep and five or six feet wide with a rise in the centre. Place the cabbages close together on the ground roots upwards in this shape:—

(the dots represent the cabbages). Fill in between with dry soil about six inches deep, and on the approach of cold weather bank up all over with a uniform depth of sufficient soil to keep out frost. It is also an advantage to cover with old straw, corn-stalks or brush, so as to prevent alternate freezing and thawing. At the same time care must be taken not to have them too warm—better a little on the cool side. One layer is always enough in the trench. Some growers place them stem down so that resting on the stub of stem there is a passage of air under the heads. But this is done where a pit-house is built of posts and scantling on the same principle in other respects as already described.

Where plants have been set out late in the season and not fully headed when frost sets in, it is a good plan to dig a deep furrow and place the cabbages in this with as much soil as convenient adhering to the roots, cover over with straw and soil sufficient to keep out frost and in the spring the cabbage will be fully headed, white and crisp.

Cauliflowers.—In this section October ends the season for this delicious vegetable. It often happens with a late planting that a few have not perfected their heads. At the approach of frost these may be taken up and thickly planted in a moderately warm cellar, and by watering and airing good solid heads may be attained until mid winter.

Celery is not injured by light frosts, but heavy freezing is very injurious and it is well to begin the storing of this crop in good season. The first may be put away soon after the middle of October, and the whole crop should be stored away before the middle of November. Celery should always be stored when perfectly dry, and never while in a frozen state. A cool, airy cellar is the best place. The roots should be packed compactly in soil, deep enough to cover the blanched portion of the stalk. It should be inspected frequently during winter and all decayed leaves picked off. When there is not enough, or convenient cellar room for storing, select a spot well drained, dig

a pit the same as for potatoes, banking the earth up about three feet or over around the pit. Place posts in the ground along the centre of the pit, saw the tops off level and nail on a scantling. From this ridge place scantling at proper distances and cover with boards. Cover this with soil enough to keep frost out. The celery is placed in the bottom of this pit, which should be aired in fine weather.

ALEX. McD. ALLAN.

MR. BEADLE.—In our part of the world I find that our market gardeners are cultivating celery somewhat differently from what we used to do when we were boys. They plough the ground, mellow it, and make it rich; and then they just take the plough and make a furrow and set the plants out in it. They then cultivate it and take care of it while it grows up. Towards the fall of the year, when they want to hill it up, they run the plough through between the rows of celery, and then go along holding the plants in the left hand, and firm the earth up to them with the other hand. They then put the plough in again, and throw some more earth up, and so on. They bank the earth against the plants and keep it that way until the autumn, when they dig it up. Some plant it out again in trenches two or three feet wide, and set it down as though they were setting it out, with a couple of boards on it like a sort of roof. They also throw a little litter on it so that they can get at it in the winter. Others have a sort of above-ground cellar, and they pack it away in that with some soil around the roots as though they were setting it out to grow, and in mild weather these plants will grow away there in the cellar. I have known them to grow a foot longer in the course of the winter. In that way it is blanched; and they take it to the market as they want it in the winter.

MR. WILSON ARNOTT.—I have had some experience in growing cabbage. I think that of the late varieties Fottler's Drumhead and the large Flat Dutch are the best for the summer varieties. I generally raise the American Jersey Wakefield and the Winningstadt. The Wakefield comes about the 1st of July, and will bring about ten cents a head. The Winningstadt is about ten days later.

MR. EDWARDS.—Ten years ago I planted some cabbages between my currant bushes, and I never raised better cabbages. I first of all made my hill, puddled it well, then put my seed in, and afterwards put in about half a teacupful of hardwood ashes, and covered it up, and never did anything more, and I had the best cabbages I ever raised.

BLACK WALNUT.

MR. BEALL then read the following paper on the question, "In what parts of the Province can Black Walnut be profitably raised?":—

"The impression seems to prevail, generally, that the Black Walnut, which is indigenous in Kentucky, Indiana, Illinois, Ohio, the southern part of Michigan, and in only a very small portion of the extreme southern part of Ontario, will not thrive in the more northerly portions of the Province. Why this impression so generally prevails I do not know, as many of our best fruit-trees, flowering-shrubs, and also some of our forest trees, are natives of countries far south of the localities in which they are successfully grown. The nut of the Walnut, so much used as a dessert fruit, is the product of a tree of the *Juglandacea* family—*Juglans Regia*—and although a native of Persia, may now be found in large numbers in nearly every country of Europe. That very excellent map, compiled by Messrs. Bell and Drummond, showing the 'Northern limits of the principal Timber Trees in the Provinces of Ontario, Quebec, New Brunswick and Nova Scotia,' may possibly have done much to establish this impression: but it should be borne in mind that the authors of this map had nothing to do with acclimatization, or other kindred theories: they simply gave what they professed to give, viz: the northern limit of the principal timber-trees, and according to this map, the northern limit of the Black Walnut, when this Province was an unbroken forest, was a line nearly parallel with,

and a few miles north of the northern shore of Lake Ontario, having its eastern extremity at or near where Cobourg now stands, and extending westerly to a point where London now stands; thence in a north-westerly direction to Lake Huron. The reason why this line was its northern limit might be an interesting subject for investigation; but it is not my purpose at present to proceed on this branch of the subject. The fact is well established that the line indicated was its northern limit. Subsequent events, however, prove conclusively that its extension northwards, and also to the east, was not prevented by the severity of the seasons or unsuitability of the soil. Mr. G. M. Dawson says 'one specimen at least has been growing in the Province of Quebec for over forty years and is perfectly hardy.' The Hon. H. G. Joly, who has planted a large number of walnut trees in the Province of Quebec, says their growth is beyond his expectations, and gives dates and figures, showing the rapidity of their growth. One tree in 1880 was fifteen feet and a half high, having been grown from a nut planted in 1874. All his trees are quite healthy. There are many trees growing on my grounds in Lindsay, measuring from 20 to 28 inches in circumference four feet above the ground, which are not over 13 or 14 years old. In England it has proved itself well-suited to the climate and soil, and is now pretty generally cultivated throughout that country as well as in Scotland, both in the Highlands and Lowlands. It is also grown in some parts of Denmark and of Sweden, where, however,—as in some other northern localities—it produces no fruit. I know no reason why it should be less hardy than the sugar-maple and basswood, and as the northern limit of these trees is about 250 miles north of Lake Ontario, it seems quite safe to say that the Black Walnut can be successfully grown in any part of the Province of Ontario, wherever the soil is suitable.

Let it be conceded that the Black Walnut can be successfully grown in Ontario, the question very naturally arises: Can its growth and cultivation in Ontario be made a profitable enterprise? That is to say: Would it be a safe and wise investment to plant Black Walnut trees on a large scale simply as a business transaction? In this connection the following questions naturally present themselves for our consideration:—

1st. What amonnt of money will it be necessary to invest for the planting of a given area?

2nd. How much will be required for future cultivation and maintainance?

3rd. How many trees can be grown in a given area?

4th. What amount of time will be required for the trees to arrive at maturity?

5th. What will be the market value of the trees at maturity?

1st. The amount of cash necessary for the first investment will be the price only of the land intended to be used for that purpose, because the crops which should be grown on the land for the first fifteen years, together with the proceeds of the sale—or use of—the trees it would be necessary to weed out, would amply repay the small outlay for nuts, and also for the planting and subsequent care of the same for that length of time.

2nd. The money which could be realized from the sale of trees which it would be necessary to thin out, from time to time, after the first fifteen years, would much more than re-coup the owner for all cost for care, cultivation, interest on capital, and maintainance from that time forth.

3rd. I have no exact data at hand, showing the number of mature Black Walnut trees, which should occupy an acre of land. The tree, if grown isolated, will be short in the trunk, with a very wide, spreading head; but, if grown closely together, will be long in the trunk, and the head much more contracted. As this is a question of profit, which can only be obtained from *timber*, it would, therefore, be advisable to grow the trees as closely together as possible. It will require about 3,000 nuts, or between five and six bushels, to plant an acre, in rows, eight feet apart, and the nuts two feet apart in the row. Within three years, three-fourths of the trees should be removed, leaving the remaining one-fourth, eight feet apart each way. These could be allowed to stand until they became sufficiently large to pay the expense of removal, which would be in from 15 to 20 years from date of planting, by which time three-fourths of this number may be removed, and three-fourths of that number might be advantageously removed during the succeeding 20 years. There would then remain about 40 trees to the acre, distant

from each other about 32 feet, at which distance they could be allowed to remain for the next 100 years, if necessary.

4th. The length of time required for Black Walnut trees to arrive at maturity is not easily ascertained. The "Timber Trades' Journal" states that the Canadian Walnut was first introduced into England in the year 1656, and that many very old and magnificent trees may now be found in many parts of that country, whose ages are not known. One, however, which stands in the grounds at Fulham Castle, is known to be over 150 years old, and is yet a healthy tree. It is five feet in diameter and over 50 feet high. As the question, with which we are most immediately interested just now is one of profit, I prefer quoting the evidence of those who are well qualified to speak, rather than give my own opinion. Horace Greeley, when speaking of the value of Black Walnut timber says: "That growing indifferent timber when this best and most valued timber would grow as rapidly, is a stupid and costly blunder." Prof. L. H. de Friere, of Kentucky, says: "If farmers could only consider that a single tree of good Walnut timber is worth more than their best acre of land, they would take more pains to encourage the growth of a timber which is becoming so scarce in our country, and for which there is such good demand." Judge J. E. Whitney, of Iowa, says: "If I were to plant a section of timber for an investment for my children, I would have it all Black Walnut." Mr. James Dougall, of Windsor, speaking of the size which the Black Walnut may attain, in a given number of years, says: "In 1853, I planted a row of Black Walnut trees. . . . . I now find only four of them left, the largest of which measures four feet in circumference at the butt, three feet six inches at six feet high, and three feet at fifteen feet from the ground; and upwards of forty feet high. . . . . Had the nuts been planted where the trees were to stand, and had they not been injured by buildings so near them, they would probably have been much larger." I take the following from a late American paper: "Twenty-three years ago, Horace Everett planted 23 acres of waste land with Black Walnuts. The trees are now 20 inches through and have been sold at $27,000." The Hon. H. G. Joly, writing of the growth of the Black Walnut, in the Province of Quebec, says: "I do not hesitate to say that the Black Walnut, under ordinary circumstances, at the age of 75 years will have attained twenty-one inches in diameter." Thomas Meehan, in a late number of the "Gardeners' Monthly," says: "When travelling through Indiana, some weeks ago, the writer saw some Black Walnut logs that had been bought for $100.00 each. Even under the ordinary course of nature, such logs could be produced, in forty years, in an Indiana climate; but, with little careful culture, in infancy, such as one would give corn, we believe as good logs could be had in half the time." A Black Walnut tree stands but a few miles from this town (Trenton), within a few feet of the water, on the lake shore, in a very exposed position, which measured about 21 inches in diameter, two years ago. The owner of which states that he saw his father plant the nut, from which the tree grew, about seventy years ago. The growth of this tree agrees very nearly with the estimate of growth made by the Hon. H. G. Joly, for the Province of Quebec.

5th. I am almost afraid to give even the most moderate estimate of the value of an acre of well-grown Black Walnut trees, at maturity, or even when the trees shall have sufficiently matured to justify their removal, which might be from 60 to 100 years from date of planting; but, from the foregoing, it would seem a very moderate estimate, to place the value of each well-grown tree, at about that age, at $100.00, which would give the enormous sum of $400,000 as the value of the trees on a 100 acre lot.

This paper is already too long, although I have endeavoured to confine myself as closely as possible to the question proposed, that is, to view it as an ordinary business transaction; but, if the subject was continued to its legitimate conclusion, showing the climatic effects resulting from large areas of such plantations and also the physical effects which might result to the inhabitants in the neighbourhood of such forests, it would overtask my ability to portray, and your patience to listen.

Mr. James Peck.—In our township we have just one black walnut tree, and it has been growing ever since I was a little boy. They have endeavoured repeatedly to raise

other young trees from the walnut, but the nut has always failed to germinate. The tree I refer to is healthy, and produces a fair crop of nuts; but that is the only tree I know of in the county.

MR. PRESIDENT DEMPSEY.—There is a black walnut tree standing in the county of Prince Edward that would make two standard saw-logs. I got a bushel of nuts from it last fall, and I have only three of them that have germinated. I saw walnuts that were planted a year ago, and they failed to germinate till near the fall.

MR. LESLIE.—We have grown very few of the trees. We find great difficulty in germinating the nuts. They live all right after they are germinated.

MR. GOTT.—Both the black walnut and the white walnut, if they are covered with damp earth for the winter, immediately upon their being taken from the tree, and then planted in rows in the seed bed, will usually germinate, the whole of them; but should not the whole of them germinate, they will quietly lie there till the next spring and then will germinate. After they are germinated they will grow, and are easily cultivated, Transplant them the next spring, and they are easily got along with.

MR. GRAHAM.—A year ago there were some nuts sent me, and I have two trees growing from them now. I put them out a year ago this last spring. There were trees grown there before that that were drawn to Belleville as saw-logs. They are quite hardy.

COL. MCGILL.—There are walnuts growing in East Whitby and West Whitby—I think the largest in the group is eight or nine inches through. I find no difficulty in germinating the nuts, more than I do those of the common butternut. I generally put them into a box and fill it up with sawdust, and let it stand out in the ground all winter and freeze, and then move them in the spring, and set out those that have cracked. When I was a boy there was a good deal of walnut growing about the Whitby harbour. I have seen nothing approximating to profit in growing black walnut, the second crop. I am quite satisfied that if all the walnut trees that are growing in the two Whitbys to-day were cut and sawed, we should not get a hundred feet of black walnut altogether. The trees grow too slowly; our grand-children might profit a little by them, but nobody before them. Up about Goderich there used to be plenty of black walnut, but it has never been a natural tree to this section of Canada, and I question whether it is to be expected that where trees do not grow naturally you can set them out and make them a success for lumber.

MR. PRESIDENT DEMPSEY.—There is no question that the man who planted this tree that I refer to is a younger man than Col. McGill, and he got two standard saw-logs out of it.

MR. BEALL.—With regard to germinating the black walnut, our friends here should not give up because they do not germinate the first year. I have a lot of trees that germinated only after they had been in the ground three winters; and then every nut came up. If the nuts are fresh and good when they are put into the ground, every nut will grow; if they do not come up in three years they will in four or five.

MR. DUCK.—My attention has frequently been called to the cultivation of the walnut, and I am perfectly satisfied that, if it is properly cultivated, and in the proper localities, it will grow easily and rapidly. I find that in a very few years it will attain considerable thickness. Even if the ground was kept for the express purpose of cultivating that tree it would be a paying crop. But if that plan were adopted, it would be better, perhaps, to make a selection of the seed that would be adapted to a certain locality. I know that if a walnut falls on the ground, and remains there all winter with a slight covering, it will grow in the spring without any attention at all if the fruit is perfect, and I have no doubt if there was a bed prepared for it, it would attain maturity and be more perfect.

MR. ARNOLD.—I do not like the idea of the nuts lying three or four years in the ground. Last year we put a couple of bushels in the cellar, kept them moist, and now, I should say, almost every nut has grown, and the trees are a foot high already.

MR. JAMES PECK.—Did they freeze at all?

MR. ARNOLD.—Some of them may have frozen.

MR. PECK.—I understand they would not germinate without freezing.

MR. PRESIDENT DEMPSEY.—Ours were frozen.

MR. ARNOLD.—Somewhere in the neighbourhood of St. Catherines there are English walnuts which are fruiting now. If we could only succeed in crossing them, and raising our own English walnuts, we should be doing a good thing for the country.

REPORT ON FRUIT AND FRUIT PROSPECTS IN THE COUNTY OF LAMBTON FOR THE YEAR 1882.

GENTLEMEN.—After considerable reflection as to the subject that I could bring before you to be most interesting to you at present in this the midsummer meeting of our *Ontario Fruit Growers' Association*, I have concluded to present, to the best of my ability and as briefly as possible, a condensed report of the condition of our fruit in the county of Lambton for the present year. In a general way and in a medium season, this county is extensively known among the counties of Ontario for its abundance of rich and beautiful fruits that are the pride and the blessing of its cultured and fruit-loving people. We are, however, exceedingly sorry to have to report that the present season is likely to be one of intense and general scarceness in all our large and staple fruits, especially so in our apples and peaches, and to a felt extent in our plums and our pears. The strawberries in a young and tender state were also badly affected by frost, and to some extent, also, the gooseberries and currants. In our beautiful raspberries and blackberries and in our grapes, those later blooming varieties of fruits only, are we likely to have a full and profitable crop.

About March 28th, the spring appeared to be opening out early after the mildest open winter ever known amongst us. The weather suddenly became fine and the ground on high and well-drained soils became dry and workable, and we thought that "*now spring has surely come.*"

April 4th.—We began to work in the garden and nursery, taking up trees, &c., and the weather was nice and dry and every appearance of an early and pleasant spring for this entire country.

April 10th.—We discovered that the great mass of fruit buds on the peach trees were already killed and ready to fall off. This saddening effect was doubtless caused by the prolonged and unprecedented mildness of the winter and by a very sudden change of temperature which occurred January 22nd and 23rd, and swept over the entire country from west to east. The day before the change the weather was mild and raining, and in a few hours the temperature went down to 16° below zero, and in some places to 20° below zero, accompanied by a strong and piercing wind and was most disastrous to the peach crop of this entire country.

April 20th.—Much cold with rain and some snow keeps the spring backward and the weather is still catching and very uncertain, yet much spring work is being successfully done.

May 10th.—Still much cold and intense rains accompanied with some snow retard the movements of an early spring.

May 18th.—The weather is now very gradually warming up and becoming more and more spring-like. The leaf buds of some of our trees are already swelling for opening, and the singing of the birds is already heard in our midst.

May 20th.—Rapid changes are taking place in nature. The weather is fine and spring-like and garden and field operations are fast hurrying on to completion, and the country is wearing a renewed appearance.

May 31st.—During this week the most superbly gorgeous exhibitions have been opened up to our view that could be well imagined. The fruit trees were decked in rich and lively colour and the bloom was most abundant, cheering our hearts with promises of fruitfulness. The whole seemed to open out at once and the abundant bloom of the apple is vying with that of the pear; and that of the cherry with that of the plum; and the gooseberry and currant, with that of the strawberry, and all crowded in one picture completing a sight the most intensely gorgeous, and we ask, "*what will the fruit be?*"

June 3rd.—Heavy and constant rains occurred to-day, deluging the whole country

with floods of water, but still the warmth continues, and we hope no harm will result, but rather much good to the crops of grain and fruit of this country, filling our hearts with joy and gladness for abundant mercies bestowed.

June 5th to the 10th.—Strong winds; much cold and some frost has lately much prevailed, and may possibly tell disastrously on the young and tender fruit of this country.

July 1st.—The annual birthday of our young Dominion, beautiful and fine but rather inclined to wet. It now appears that the injury done to our fruit crop by the cold and blighting winds of last month was widespread and very destructive, more so than we have had it occur here for many years. The leaves of the peach trees are almost totally shrivelled up and destroyed by the disease known as *curl*, which was no doubt caused by the same destructive influence. This is the worst attack I have ever seen, and in some cases will nearly, or quite, kill the trees. The young and tender strawberries just setting were in many cases badly frozen, and the crop will be much injured in consequence, but on the whole the crop now getting ready for picking is very fine and tolerably good. Some new varieties have come into prominence this season and promise to be popular and good. One of these is Duncan, a very fine fruit, and the plant is very prolific; and another is Warren, also a very fine promising fruit. We are very sorry to have to notice that the apple crop is much injured and almost totally ruined by the same destructive influences before noted. So severe were its dire effects upon the apple trees that the leaves are blighted, blackened and destroyed, and in many cases falling prematurely from the trees, giving them an untimely autumn appearance. This is very surprising to our orchardists, and many of them wonder what is the matter. What little fruit is setting on the trees will neither be beautiful nor good, as almost every specimen is badly injured on the upper side and will be scabbed and puckered, and of course unmarketable. Pears are almost as badly affected but not quite, and the specimens that are setting are not so badly injured. There seems to be no difference in varieties, as far as these effects are concerned. The influences on the cherry and the plum trees were not so disastrous as on the fruits before noticed. The first of those fine fruits is now ripening up very nicely; and were it not for the thieving propensities of our birds, we might pick a very fine crop, but as it is now the cherry cannot be depended upon for a crop of fruit, for the birds have them away before the fruit-grower can secure a specimen to test its luscious qualities. We find also that the Duke and Morrello classes of cherries would be the most desirable to plant on account of their ability to withstand disease. Of the latter we are glad to report the prospects good for a crop wherever the trees have been attended to and systematically and persistently jarred to keep off the dreaded *curculio*. Reine Claude de Bavay and Lombard are still trusty and best varieties to plant for market sorts. Scarcely a solitary peach will be had to grace our scanty board. Gooseberries and currants are also considerably affected, but still in these fruits the crop will be a medium one and some fine samples may be picked although not abundant. Raspberries and blackberries, on account of their later development, will come off clear, and the crop wherever well attended to will be large and good. The Black Cap varieties will be exceedingly abundant and fine. Mammoth Cluster and Gregg are the staples. Though the strawberry crop is still very popular and very profitable, yet in these fine fruits we have great confidence as they fill a much-needed place on the board. In our grapes we appear to have our only hope of reliance for a good fruit crop this coming autumn. In these fine popular fruits we have a great advantage in that we have the power of protecting them from the severity of our well-known treacherous winters. By the simple operation of laying down the canes late in the fall of the year and covering them slightly with earth to keep them down so that the cold and perishing winds cannot pass over them, they are safe and will come out after the most dreaded season unharmed and ready to bear a full crop. This is a point of great value in the grape, and could we do it in case of our peaches and pears it would be of inestimable worth. The young grape crop at the present time is full of flattering promise, and the numerous and magnificent bunches are just now setting full and splendid, and are the hope and the joy of the attentive and intelligent fruit-grower. Rogers' Hybrids are particularly full and promising this sesson and so is Hartford Prolific and Champion, but Concord and Delaware, having borne such a massive crop last season, are not so full. Martha is a grape of great promise, and for a fine, hardy, popular white grape, fills the

bill, and apparently leaves nothing to be desired. As yet both the fruit and the leaf are clean and free of all disease, and destructive insects on the vines are not troublesome. We notice that the Thrip on the leaves is spreading rather more this season than usual, and one lady showed us her vines yesterday that were almost destroyed by them, but we think they could be easily managed. The value of the grape crop of this country is becoming more and more apparent every year as one of those crops that can be relied upon in every emergency.

Yours, &c.,

B. GOTT.

Arkona Nurseries, July 12th, 1882.

REPORT OF COMMITTEE CHARGED WITH THE OVERSIGHT OF FRUIT AND FOREST PLANTING AT THE AGRICULTURAL COLLEGE, GUELPH.

To the Honourable the Commissioner of Agriculture:

SIR,—The Committee of the Fruit Growers' Association charged with the duty of directing the operations in Horticulture and Forestry at the Agricultural College, Guelph, beg to submit the following report:

The orchard begun in 1880 and extended in 1881 is in a healthy condition, and the trees are making as rapid growth on the whole as could be desired. It has been the aim of your committee to make this orchard not only an experimental one, wherein shall be tested every variety of fruit at all likely to succeed in this climate, but also to grow therein a sufficient quantity of the most valuable varieties to give an ample supply for the use of the College.

APPLE.

There is now growing in the orchard six hundred and seventy apple trees, comprising ninety-two varieties. Those planted in largest quantity are Golden Russet, Roxbury Russet, R. I. Greening, Wagner, Northern Spy, Baldwin, Swayzie Pomme Grise, Snow Apple, Ribston Pippin, Talman Sweet, Mann Apple, Duchesse of Oldenburg, Gravenstein, St. Lawrence, Alexander, Norton's Melon, Chenango Strawberry, Twenty Ounce, Early Harvest, Red Astracan, Keswick Codlin, etc., and of those more particularly intended as experimental, only two trees of a kind have been planted.

PEAR.

There are ninety-three pear trees now well established comprising thirty-six varieties. Fifty-three trees were planted temporarily in nursery row, comprising sixteen sorts. These will be placed in the orchard next spring.

PLUM AND CHERRY.

The portion devoted to plums contains sixty-six trees, comprising twenty-three sorts, and that set apart for cherries contains fifty-one trees comprising eighteen sorts.

THE VINEYARD.

We are gratified in being able to say that the grape vines have done remarkably well, and while making a thrifty growth have matured their wood perfectly. There is now growing and well established five hundred and thirty-six vines, comprising fifty several different varieties. These will soon come into bearing, and become an interesting opportunity for study and comparison, while at the same time yielding a supply of agreeable fruit for the College tables.

SMALL FRUITS.

These yielded some fruit during the past summer, and although your committee thought they had planted liberally of these, having put out over two thousand raspberry

plants and nearly four thousand strawberry, yet it was found that the requirements of the College were far from being met. In addition to the raspberry and strawberry plantation there are three hundred and twenty-three gooseberry and two hundred and twelve currant trees growing. These comprise twenty-one varieties of raspberry, thirteen of strawberry, three of gooseberry and four of currants.

Forestry.

The several clumps of Black Walnut, European Larch, Butternut, Sugar Maple, and of mixed trees, are doing fairly well, except that the group of Larch from some cause did not succeed, probably owing to the dry character of the soil in which they were planted. There is, however, a sufficient number of young Larches in the nursery plot to supply all the vacancies. It was found desirable to use the field in which the clump of Ash had been planted as an experimental grain plot. On this account they have been taken up and will be set out in another field next spring. The experiment of growing Black Walnut with and without cultivation is already demonstrating the fact that the growth is much more satisfactory where clean cultivation with occassional stirring of the soil is practiced. The nursery plantations of young trees will supply a considerable portion of the trees required for the proposed enlargement of existing clumps, and by keeping up a constant succession of nursery plantings the required trees for foresting purposes can he always at hand in the best possible condition for transplanting.

The Arboretum.

In attempting to extend the Arboretum the Committee found that it was absolutely necessary to re-arrange the front grounds, and to provide some definite and well arranged plan that harmonized with the grounds and buildings on which to base all future work. Hitherto no such plan had been prepared, hence it was impossible to proceed systematically with the extension of the Arboretum in a manner that would subserve the purposes of education and at the same time adorn the grounds and produce the proper landscape effect.

After some correspondence we were so fortunate as to secure the services of the most eminent landscape gardener in America, Mr. Charles H. Miller, of Fairmount Park, Philadelphia. He visited the College in April last, and examined the grounds thoroughly in company with yourself, the Committee and the architect. He has now prepared and placed in our hands a most admirable plan of all that part of the grounds; this plan has been approved by yourself, and when the planting and grading shall have been completed in accordance therewith, we believe that the College grounds around and in front of the buildings will be all that can be desired. Work has been already begun, and the grounds immediately in front of the main building laid out in conformity with the plan, and the requisite carriage ways to the recently erected residences of the Professor of Agriculture and of the Bursar provided. Already a great improvement in the appearance of the grounds is manifest, a pleasing foreshadowing of the results to be achieved when the whole work is once completed and time enough shall have elapsed to produce the growth necessary to give due effect to the whole. Ample space is now set apart for the planting of an extensive arboretum which your Committee intend shall be grouped in such a manner as to be convenient for study by the young men and serve as illustrations in teaching, and at the same time these groups will be so placed as to give the best landscape effects.

The new buildings, including those which have been erected this summer and those which are contemplated in the future, have been located upon the plan with a view to the general effect of the whole when they are completed. The buildings yet to be erected, and which are already very much needed, are the conservatory and propagating houses, with lecture-room attached; a chemical laboratory for teaching analysis of soils, manures, etc.; and the head-gardener's residence. It is to be sincerely hoped that the Legislature will grant at its coming session the funds that may be needed to erect these buildings, the lack of which greatly cripples the effectual working of the chemical and horticultural departments.

The Seed Beds.

With a view to giving a supply of young trees for future planting, and to afford at the same time instruction in the raising of forest trees from seed, a number of beds were prepared and sown with tree seeds. As was to be expected some of these seeds failed to germinate the first season, and after lying dormant in the ground for a whole year, came up in the second spring. From these beds a goodly number of some varieties of trees and shrubs will be obtained. Some of the kinds sown have apparently failed altogether, thus affording lessons to the students from failure as well as success.

Future Operations.

We have made arrangements with the Professor of Agriculture for a half acre block in the Experimental Field, which it is our intention to surround with a hedge formed from a variety of hedge plants, for the purpose of showing a sample of hedge formed from each. This will afford both students and visitors an opportunity of seeing the results produced by each plant when trimmed close and grown as a hedge, and test the adaptability of each for hedging purposes. The enclosed plot will be devoted to nursery beds for the growing of young trees taken from the seed beds or procured by purchase, until they have attained sufficient size to be removed to permanent situations. It is also intended to set out in the spring two or three additional clumps of forest trees, one of White Ash, one of American Elm, one of Mixed Evergreens, also to complete the group of European Larch, and extend that of Sugar Maple.

In the orchard all vacancies will be filled up, and the acre of ground recently purchased planted out so as to complete that portion; and such other varieties added as may be desirable for the purpose of testing their adaptation to our climate. Some additions will also be made to the plantation of gooseberries, currants, raspberries, and strawberries, in order to furnish a sufficient supply of these fruits for the use of the College, a large part of which will be taken from the existing plantations, particularly of raspberry and strawberry. Some new varieties of these fruits and of grapes will also be set out in the spring together with a few mulberries, so that the work of testing these may keep pace with the progress of horticulture elsewhere.

In conclusion, your Committee would say that such progress has been made in the department of fruit culture and forestry during the short time that has elapsed since you confided these to our direction as we trust will be satisfactory to you, both in the amount of work done and in the economical manner in which it has been accomplished. In a work of this kind great results cannot be acheived in a single season, yet, even now some fruit is being gathered, some improvements we think are to be seen, and these, we believe, will increase in progressive ratio as the years roll by until the results shall be seen in an abundant supply of fruits, of all kinds suited to the climate, sufficient to meet all the wants of the College, both for consumption and comparison; and groves of trees, and groups of specimens of every variety of tree and shrub shall give beauty to the landscape, and afford means of instruction in all that a well informed yeoman can wish to know of the character and uses of the forest products of his native land.

On behalf of the Committee,

D. W. Beadle, *Secretary.*

APPENDIX.

REPORT OF COMMITTEE APPOINTED TO ATTEND THE AMERICAN FORESTRY CONGRESS AT CINCINNATI, OHIO.

To the Honourable the Commissioner of Agriculture.

DEAR SIR,—The committee appointed by you to represent the Province of Ontario at the meeting of the American Forestry Congress held in Cincinnati, April 25th to 29th, 1882, beg to submit the following report:

We reached Cincinnati early on the morning of the 25th, where we received a cordial welcome from the Reception Committee, and met a large number of distinguished gentlemen, who had gathered from all parts of North America to discuss the various matters pertaining to the important subject of Forestry. We found the arrangements for the meeting very complete; the Music Hall, in which it was to be held, centrally located and provided with ample accommodations. The following valuable papers were in the hands of the committee, which were subsequently read, and furnished ample material for discussion, occupying all the time set apart for this purpose:

1. The Forestry of the Future.....F. B. Hough, Chief of Forestry.
2. The Southern Pine.....Dr. Charles Mohr, Mobile, Ala.
3. The Walnut Tree.....Wm. H. Ragan, Clayton, Ind.
4. Distribution of Canadian Trees.....A. T. Drummond, Montreal, Canada.
5. Flora of the Black Hills.....Robt. Douglas, Waukegan, Ill.
6. Woods of Canada.....Jas. Little, Montreal, Canada.
7. Arboreal Flora of Arkansas.....Prof. F. L. Harvey, Fayetteville, Ark.
8. Profitable Trees for Florida.....J. G. Knapp, Limona, Florida.
9. Forests of Michigan.....Prof. J. M. Spalding, Ann Arbor, Mich.
10. Forest Reserves at the Headwaters of the Ohio....M. C. Read, Hudson, O.
11. Roadside Planting for Utility.....Chas. Garfield, Grand Rapids, Mich.
12. Trees of Texas.....T. V. Munson, Denison, Texas.
13. Suggestions Regarding Government Assistance, Prof. W. Brown, Guelph, Ont.
14. Historical Sketch of the Development of the Forest Policy in Germany. Bernhard E. Fernow, Lehigh Furnace, Penn.
15. Preservation of Timber.....Prof. F. W. Clarke, Cincinnati, Ohio.
16. The Work of Western Nurserymen, Present and Prospective, S. M. Emery, Lake City, Minn.
17. Culture and Management of our Native Forests, H. W. S. Cleveland, Chicago, Ill.
18. Three-Motion Plan of Planting.....Robert Douglas, Waukegan, Ill.
19. The Wild Cherry Tree.....Hon. Horatio Seymour, Utica, N. Y.
20. Useful Trees of Michigan.....Prof. W. J. Beal, Lansing, Mich.
21. The Catalpas.....J. C. Teas, Carthage, Mo.
22. Cheap, Hardy Trees for the Prairies.....J. T. Allen, Omaha, Neb.
23. Woody Plants of Ohio.....D. L. and Jos. F. James, and Dr. Warder.
24. Forests and Health.....Dr. Daniel Milkin.
25. Climatology and Forestry.....Dr. George L. Andrew, Laporte, Ind.
26. Forestry and Rainfalls.....A. Sanders Piatt, Mackacheck, O.
27. Torrents and Torrential Floods.....D. D. Thompson, Cincinnati, O.
28. Evils of Woods Pasture.....Dr. J. A. Warder, North Bend, O.
29. Droughts, Famines, and Floods in China, David H. Baily, late Counsel General of the U. S. in China.

30. Forests and Rainfall in Ontario..... Prof. Wm. Brown, Guelph, Ont.
31. The Necessity for a School of Forestry in the United States,
Gen. C. C. Andrews, St. Paul, Minn.
32. What is a Forest Tree in the Eye of the Law?
Geo. C. Brackett, Lawrence, Kan.
33. Management and Culture of the Locust..... Waldo F. Brown, Oxford.
34. Measures of Locust Trees.....Dr. J. A. Warder, North Bend, O.
35. Culture of the Locust on Long Island..... Mr. Hicks, Long Island.
36. Educational Means..... B. O. M. DeBeck, Cincinnati, O.
37. A Suggestion from the Schools of Bavaria,
Prof. R. B. Warder, North Bend, O.
38. Forest Administration in Germany.....Robert Kuchnert, Cincinnati, O.
39. Lessons from Australia and Scotland..Prof. Wm. Brown, of Guelph, Ont.
40. Suggestions Respecting a Text Book on Forestry.....Prof. Wm. Brown.
41. Advantages Resulting from the Preservation of Forests....Baron Richard von Steuben, Royal Chief Forester of the German Empire.
42. Forestry in America..... Isaac Smucker, Newark, O.
43. Forests and Trees of Northern Georgia..H. C. Freeman, C. E., Elijay, Ga.
44. Woods of Indian Territory.....J. Foreman, Muscagee, Indian Ter.
45. Growth and Destruction of Forests..Dr. A. G. Humphreys, Galesburg, Ill.
46. Climatology and Forestry.....Prof. Ingersoll, Lafayette, Ind.
47. Trees of Southern California.....Wm. Heaver, Los Angeles, Cal.
48. Complaint of Diana—Poem.....Horace J. Smith, Nordoff, Cal.
49. Why Should we Plant Trees.....Dr. A. Eby, Sebringville, Ontario, Can.
50. The Poplars and Cottonwoods.....Sereno Watson, Cambridge, Mass.
51. Tree Planting.....Simeon Eby, Lancaster, Penn.
52. Planting on Streets and Highways.....
53. Wind Breaks on the Prairies.....C. E. Whiting, Whiting, Iowa.
54. Beneficial Effects of Wind-Breaks.....L. B. Wing, Newark, O.
55. State Commissioners and State Arboreta....W. R. Lazenby, Columbus, O.
56. Timber in Illinois.....G. W. Minier, Minier, Ill.
57. Trees Growing upon the Plains of Colorado—How Influenced by Climate, Altitude and Irrigation.....D. S. Grimes, Denver, Col.
58. Nature's Plan for Reproduction.....Leo Weltz, Wilmington, O.
59. Natur Verjungung.....Prof. Adolph Leue, Cincinnati, O.
60. Colorado Hardy Conifers in Cultivation....Thos. Douglas, Waukegan, Ill.
61. Colorado Conifers in Eastern Nebraska....J. Masters, Nebraska City, Neb.
62. Experiments in Planting on Cape Cod.....Jas. S. Fay, Boston, Mass.
63. Wald Verwusting, Wald Erhaultung, Kunstliche Bewalding,
K. Ludloff, Milwaukee, Wis.
64. Wind-Breaks on the Prairies.....Suel Foster, Muscatine, Iowa.
65. Pines of New England.....John Robinson, Salem, Mass.
66. Grouping in Forestry.....Dr. J. A. Warder, North Bend, O.
67. Sylva and Plantations of Nebraska.....Gov. Furnas, Brownville, Neb.
68. Nurse Plants in Forests.....Dr. J. A. Warder, North Bend, O.
69. Evergreens on the Prairies.....Samuel Edwards, Mendota, Ill.
70. Planting by Railroads.....Robert Douglas, Waukegan, Ill.
71. Iowa's Work in Tree Planting.....Prof. J. L. Budd, Ames, Iowa.
72. Cheap Trees as a Shelter for Better Kinds.Dr. J. A. Warder, North Bend, O.
73. Mixed Plantations.....Dr. J. A. Warder, North Bend, O.
74. Native Stock for Prairie Planting....George H. Wright, Sioux City, Iowa.
75. Antimiasmatic Influences.....F. L. Olmstead, Brookline, Mass.
76. Lessons to be Learned from the Forests of Western Asia,
Prof. H. S. Osborn, L.L.D., Oxford, O.
77. Injurious Insects.....C. V. Riley, Washington, D. C.
78. Forest Insects .....Wm. Saunders, London, Ont.
79. Arnold Arboretum.....John Robinson, Salem, Mass.

80. Experimental Forest Stations.....Prof. A. Leue, Cincinnati, O.
81. Trees of Worship Among the Ancient Greeks,
Prof. Edward North, Clinton, N. Y.
82. Romance of Forests.....Gen. Durbin Ward, Cincinnati, O.
83. Distribution of Conifers in the United States,
Dr. George Vasey, Washington, D. C.
84. The Cultivation of the White Mulberry,
Samuel R. Lowery, Huntsville, Ala.
85. Profits of Durable Trees.....Dr. A. Furnas, Danville, Ill.

The first session was devoted to the necessary organization and the appointment of committees for the nomination of permanent officers, and to prepare a constitution and by-laws. On re-assembling in the evening a large concourse of citizens were present, from fully two to three thousand in number. An address of welcome was delivered by Gen. Durbin Ward, who, in behalf of the "Queen City of the West," extended cordial greetings to all the representatives assembled. Much enthusiasm was manifested by the audience when the speaker referred to the delegates from the Canadian Provinces. Governor Foster, on behalf of the State of Ohio, next spoke, welcoming in the warmest manner the delegates from abroad.

Governor Foster's Address.

Gentlemen of the Forestry Congress: The citizens of Ohio appreciate the honour which this assemblage of thoughtful and scientific people, upon this, the occasion of the first meeting of a National Forestry Congress, confer upon their State, in selecting it for the place of beginning a great work, and it affords me pleasure gratefully to acknowledge the compliment you have thus paid us, and to extend to you the welcome and hospitality of our citizens.

The subjects that are to be discussed by this Congress have worthily attracted great attention and thoughtful consideration in the countries of Europe, by the General Governments and many of the State Governments; but so far as our own country is concerned it has not attracted a tithe of the attention which the great importance of this subject demands.

The general public is just being awakened to its importance, and will watch your proceedings with more attention than has been given to any other public assembly recently held, or likely to be held in the near future.

The public need is to be enlightened upon the annual rate of destruction of our forests for commercial uses and agricultural and mechanical development, the annual losses by fire, and at the present rate of destruction how many years will elapse before the destruction reaches such a point as most seriously to affect our water supply, agricultural products, and health of our people; upon the best methods of economy in the use of timber; upon prevention of unnecessary waste; upon the best manner of securing safety from destruction by fire; upon the effect of destruction of the forests upon the climate, water supply, rain-fall, productiveness of soil and health of the people; upon the ratio of forests to cultivated land necessary to the best results; upon the most effective means for supplying the losses occasioned through fire and deforestry by farmers and lumbermen, and, finally, upon the legislation that Cougress and the General Assemblies of the several States and Territories should enact.

Your scientific and practical attainments are a full guarantee that the subject you have in hand will be most thoroughly and earnestly considered.

You will pardon me, I know, for suggesting one consideration that ought not to be overlooked, if practical results are to be obtained.

The people of this country are eminently practical, and the strongest inducement for action upon the suggestions that will go forth from you that can be presented them, is an affirmative answer to the question, "Will it pay to follow the advice of the Forestry Congress?" And I use the words "Will it pay" in a broader sense than mere pecuniary profit.

If you can furnish an affirmative answer to this query you will have made a great step forward in the work that has called you together.

Notwithstanding the magnitude of the subject to which you are preparing to address yourselves, I feel confident that through your deliberations measures will be initiated which will be of inestimable value to the health, wealth and prosperity of all the people of this country, and will mark an epoch in its economic history that will be remembered with pleasure in all the future, and I doubt not that the coming Ohio man will proudly and gratefully call attention to the fact that the American Forestry Congress distinguished his State by holding its first session in its largest city, and through its deliberations therein, were evolved and moulded into practical form great scientific truths upon the subject of Forestry, that resulted in great good to all of the people of the Republic.

The Committee on Constitution and By-laws presented their report, which was adopted. The Hon. George B. Loring, United States Commissioner of Agriculture, was unanimously elected President, and on rising to deliver his address, was enthusiastically cheered.

President Loring's Address.

Gentlemen,—I have accepted your invitation to be present on this occasion and to preside over your deliberations, not because I feel competent to instruct in the art of forestry, but in order that I might assure you of the sympathy of the Agricultural Department of the Government, and of my own high estimate of the value of your work. The question of forestry is one of the most intricate aud difficult of all the agricultural problems which come before us.

That our forests are wasted by reckless extravagance and by uncontrollable conflagrations; that they are diminishing before the immense demands upon their products, we all know. Their importance as a climatic influence is conceded. The profit of tree-growing on wisely selected lands is acknowledged. But the methods by which our forests can be restored and preserved still puzzle the statesman and the cultivator alike. The nature of property in timber lands as adjusted for the State and the individual, in all those countries where the forests have attracted the special attention of the Government, particularly in the Old World, has so much of exclusiveness and reservation for the gratification of personal desires, that we can derive but little benefit from its study. The rights and powers and duties of State and Federal legislation, as regards our forests, require the most careful and ingenious consideration. We learn from the statistical returns the vast value of forest products to our commerce, to our domestic manufactures, to our internal trade. And by constant investigation we are ascertaining the best systems of tree-planting, and of cultivating specific wood crops in favorable localities. You will pardon me, therefore, while I leave all these difficult, practical problems for the consideration of those who have brought here the results of long study and experience, and turn my attention to the value and

Importance of Tree Culture

as one of those arts by which man beautifies his abode, and manifests that taste which especially distinguishes him in the scale of animate being, and which he labors to gratify as soon as he has laid the hard and substantial foundations of State and Society. Men build first, and then plant. The primary work of erecting an empire, in which all the sturdy virtues are called into operation, and where courage fixes the national power, and wisdom establishes the national education, is not a field for the exercise of man's love of beauty. With the wars and the felling of the forests, and the log cabin and primitive school-house of a newly-settled country and a newly-founded empire, taste has but little to do. But when safety and property are made secure, and the highways are well worn, and the skill and strength of the cultivator have stripped the landscape of its natural beauty, and the foot of man has trampled out the graceful lines in which Nature always works, then there uprises man's demand for the beautiful, and he endeavors to restore by art what he was obliged to destroy for his subsistence. For whatever may be his outward circumstance, however hardening and depressing may be the incidents of his life, man has an instinctive love of beauty, which insists on being gratified. He knows that this is his distinguishing characteristic which separates him from the beasts that perish—an element of his mind and heart which leads him "from nature up to nature's God."

To him the sunrise means glory as well as daylight. The lone and lofty mountains elevate him to the contemplation of the Almighty power, even while they are "a shelter to the wild goats;" and the dewy pastures where the cattle graze and recline in the long shadows, lull him to the sweets of evening repose; the sparkling stream, "where the wild asses quench their thirst," will soothe and sing him to happiness and rest. The majestic and commanding tree, whose widespread branches shelter the panting animals from the blaze of the noon-tide sun, is a picture of power and strength and varying loveliness, which is to him a source of never-ending delight. When his eye surveys the swelling landscape, the emotions which belong to him as a child of the Creator of all, inspire and elevate him above the earth on which he treads, and distinguish from that other order of animal existence, to which all scenery is alike, whose sensibilities no ugliness of nature or art offends, which no starry heavens delight, and no homely surroundings disturb; whose vision is blind both to the graces and deformities of even its own kind, which nibbles the daisy and the June grass with equal satisfaction, and whose soul "cannot rejoice with those who rejoice, nor weep with those who weep." It is man alone who knows that "a thing of beauty is a joy forever."

Taste in Tree Planting.

It is in accordance with this sentiment that man has applied his skill and taste to the creation of all the charming scenery of groves and bowers and gardens, to the enhancement of natural beauties themselves. Great gardens of antiquity, the monstrous towering pleasure grounds of Rome and Babylon, set an example which advancing civilization has not failed to follow. The cultivation of parks and gardens constitutes one of the most interesting and important duties of modern art—a duty of the faithful performance of which England has set an admirable example. Leaving, in the early part of the eighteenth century, the formal and heavy style then in vogue, through the influence of some of her illustrious poets—Addison at Bilton, and Pope at Twickenham—the English people revolutionized that whole system, and established that classical style of planting which has since been so much admired and imitated throughout the most refined parts of Europe.

This science of landscape gardening, which advanced so slowly in the Old World, and the proper system of constructing a city with light and water, and parks and shaded streets, which was so shamefully neglected until a comparatively recent period there, have until within a few years been entirely overlooked in our own country.

When more than seventy years ago, the city of Cincinnati was founded, and the spot was chosen on which has been erected such a splendid array of public buildings, private dwellings, music halls, art galleries, churches and libraries, the application of art to the arrangement of gardens, parks, streets and highways, was hardly thought of. It was enough to clear the land and till it without converting it into a pleasing picture. It was all the early settlers in our country could do to blaze a path through the forest without considering how best to crown and drain a highway, and it was not until after the Revolutionary war that the planting of trees and shrubs was made a necessary part of the laying out of gardens and grounds. I remember well the only garden in the State of Massachusetts, laid out early in this century by an English gardener, and kept in good order to within a dozen years, an object of delight to all who were allowed to enter its sacred inclosure and perambulate its well-visited walks. Such a scene as this was rare. Public-spirited citizens planted avenues of trees in highways, and were considered benefactors. Here and there a "door-yard" was ornamented with clumps of lilacs and syringas, but nowhere, that I am aware of, were there associations of enterprising and tasteful citizens organized for the purpose of adorning their towns and of providing for the health and comfort of themselves and of the community of which they formed a part. It remained for our own generation to unite for so important and laudable a purpose; and I congratulate this beautiful city that its natural comeliness has been enhanced and its suburbs made delightful by the combined efforts of those who believe that a love of beauty is a human attribute, and that we are under a sacred obligation to preserve that health which is given us for a high and useful purpose. The practical service of an asso-

ciation like this, as I have said, it is not necessary for me to discuss here, in the presence of those who know by experience how trees and shrubs should be grouped ; who have learned that an evergreen should be transplanted in August, and that a little lime and muck applied to the roots when it is planted will give it a wonderful stimulus ; who understand that a plantation of trees should be made to suit the building it is to surround and the landscape it is to occupy ; that trees should not be planted too near a building, or too near each other ; that the plants nearest the house should be low in stature and of a beautiful sort ; that the shades of green should be properly blended, and the foliage selected accordingly ; that trees should be protected by each other against those winds which are obnoxious to them ; that the Norway will not bear the rough gales from the sea, and that the Scotch pine rejoices in them ; that trees and plants should not be "marshalled in regular order and at equal distances," like beaux and belles standing up for a quadrille or country dance ; "that it is easier," as Downing says, "to make a tasteful park by planting new trees than by thinning out an old forest, and that nature herself is full of hints and suggestions," an observance of which constitutes the highest art of which man is capable in all that work of which earth, sea and sky form a part. With all this you have long been familiar, as the practicable part of a most agreeable labor ; but for the trees themselves, these living monuments of nature's bounty, or of man's skill ; those landmarks which we love to contemplate, those sentinels and armies along the landscape ; those silent friends who somehow connect themselves with so many of the dearest scenes and events of our lives, and watch over the graves of the departed day and night, and through all the changing seasons—for the trees themselves let us say a word.

Beautiful Trees.

Now I know not how it is, but next to the face of an old friend returned from a long absence, the sight of a landscape or a tree, once familiar and connected with the early events of our lives, long lost and now bursting upon our vision, fills us with the tenderest emotion. Who that has suddenly come upon a flower by the wayside in a foreign land, which grew beside some well known path in the country of his home, has not been filled with sweet recollections and transported to that spot which will forever outshine the glory of all others ?

How often have we turned our eyes unexpectedly upon a solitary tree keeping watch and ward over a hillside pasture, and at once, as if the heavens had been opened, there came a vision as dear to us as the memory of that sacred band of the loved and lost ! How often has a footpath, winding through the woods, opened suddenly upon us, and in a moment a long past, and perhaps long-forgotten hour of joy, shone round about us ? The trees are indeed our companions, clothed by us with the most delightful associations, appealing and responding at once to our sense of beauty, and preserving, as it were, with tender care our choicest memories. Their story is all told and well told by the young Indian who, in the midst of the splendor of Paris, regretting the simple beauty of his native island, sprang forward at the unexpected sight of a banana tree in the Jardin des Plantes, embraced it while his eyes were bathed in tears, and exclaiming with a voice of joy, "Ah, tree of my country," seemed by a delightful illusion of sensibility to imagine himself for a moment transported to the land which gave him birth.

Trees of History.

And then what a living and vital interest gathers about those trees which either by accident or by design have become monumental and representative. To know them well is to be intimate with the great deeds and the great men of history. Into what classic associations and deeds of daring, and raging and majestic conflicts by land and by sea, and profound mysteries and rites are we borne by the long and interesting story of the

Oak,

the tree which Pliny says held "*Honos apud Romanos perpetuus*"—the highest honor and repute with the Romans. We recall the solemn ceremonies of the Druids among the oak groves which stood strong and solemn on English soil, during the morning

twilight of English civilization. The scarred and sturdy tree near "White Lady's," in which the defeated monarch hid himself after his almost miraculous escape at the battle of Worcester—how like a guardian angel it stands in the history of royalty in England.

The contemporary of this tree, the wide-spreading oak of Hartford, spared from the primeval forests of America, as imposing and perhaps as ancient as the Pyramids, decayed and broken, concealing in its stout heart the Charter of Colonial Privileges—what a cherished and commanding figure it is in the record of freedom on this Continent! What a tale of valor and proud endeavor, and the heroism which triumphs where "the battle rages long and loud," could that pasture oak tell, which was borne from the fair hillside of Andover, Massachusetts, to become the sternpost of the immortal frigate, Constitution?

The Elm.

Call to mind now the story of the elm tree, and what a mingling of fable and fiction and interesting fact gathers around it. When Orpheus returned to earth from his melodious mission for Eurydice to the dominions of Pluto, and sat him down upon the verdant hill, it was the elm which first responded to his plaintive airs, and offered him his refreshing shade. It gave its name to the imperial city of Ulm, in Germany, and as Elmwood it designates the home of one of the most brilliant of modern American poets.

The elm planted by Henry IV., of France, in the Luxembourg gardens of Paris: the elm which Queen Elizabeth planted with her own hands at Chelsea, while waiting for the crown; the elms planted by Sir Francis Bacon in Gray's Inn walks, will not be forgotten so long as the memory of these remarkable persons shall endure. And when we turn to the pages of Columella to learn the food most used for cattle in his day; and to the plays of Plautus to read with what twigs the Roman rogues were beaten; and to Evelyn to find out what timber made the best pipes, pumps, poles, ship-planks, beneath the water line; and to Galen and Pliny for a sovereign remedy for all the ills that flesh is heir to—we find that the elm reigns supreme, and is nutritive, corrective, medicinal, and imperishable, alike. To my mind there gathers around this tree, also, historic assosociations at once romantic and tender. One hundred and fifty years ago, Captain John Lovewell, of Dunstable, Mass., with a little band of forty-six followers, started in early spring to drive Pangus and his tribe of Piquackets from the fertile lands which they occupied near Fryeburg, Maine, and from which they made their murderous assaults on the white settlements. The march was through pathless woods, and the expedition was one which required all the strength and courage which man can possibly command. Chaplain Frye, who accompanied the little army, was a young man, born in Andover, a graduate of Harvard, an exemplary youth, an accomplished scholar, and a devoted servant of Christ, the profession which he had chosen. On that beautiful May morning, when Captain Lovewell's men were ambushed by the Indian warriors of Pangus, on the shore of the Piquacket Pond, Chaplain Frye was one of the first to fall mortally wounded. When he left his home to join the expedition he planted an elm tree, in that early spring time, on a commanding eminence in his native town, in order, as he said, that he might be remembered should he fall in battle; and there it stands at this day, a lofty and noble monument to the devoted young Chaplain, putting on its green robe each year on the anniversary of his death, and taking on its sad, yellow hue in the autumn as if in mourning for him whose name it bears. And to every son and daughter of America, what a representative tree this is! Would you learn its significance? Go with me, then, to that ancient farmhouse, standing as it has stood for more than a century on that sunny slope which our fathers loved so well. That ancient dwelling, with its broad and open front, receiving on its ample brow the sweet south wind, and with its long sloping, defiant roof in the rear, closed firm against the invading north, the type of our ancestral architecture. It stands there still, as it has stood for generations, gathered around and supported by the massive chimney, which has so long sustained and warmed its hospitable heart. It is a bright June morning, and the sun is pouring in its flood of light upon the narrow entry, with its homespun carpet, and its steep and winding stairway, leading to the cheerful chambers, fragrant with sweet herbs and the sweeter air of heaven. From the sunken door-stone, trod into earth by the footsteps of many a hardy and honest genera-

tion, to the humble roadside, the green and grassy slope extends, telling its story of the joy and happiness which have gathered on its sod, and the sad tale also of sorrow and woe, how young and old have been borne out of that threshold, the child and the mother, the youth and the gray-haired father, amidst tears and sobs, down to the silence of the grave. And over all that scene the drooping elm looks down from its towering height, a witness of the domestic drama which has been acted there for years, and now the recognized type of those virtues which adorned our ancestors, those protests and assertions which made them great, the courage and defiance which made us free. Do you think there is in all the world another tree like the American elm—the accepted ornament of our ancient rural homes, the grand and solitary sentinel, seen from afar, and telling this story of American life with which you are all so familiar, and of which you are all so proud? In this centennial period of our history, too, how this tree is woven into the heroic events of our annals! There are many incidents of that great time when our fathers rose up to assert their independence; the amazing stand at Lexington and Concord; the calm and steady courage at Bunker Hill; the solemn assembling of the Continental Congress; the generous devotion of the colonies to each other; the impressive patience of our great revolutionary existence; but not one stands out in greater proportions than that scene at Cambridge, when Washington, in the calm majesty of his manly strength, assumed the command of a disorganized body of militia, named it the Continental army, and waged war against the most powerful Empire and the best disciplined troops in the world, and founded an independent nationality of freemen. The canopy beneath which this sublime event occurred has become immortal as the Washington Elm.

Who that is familiar with sacred history can fail to be reminded of the most stirring scenes in the career of God's chosen people, as he contemplates the

Cedar,

the tree which crowned Lebanon, and was associated with the highest and most sacred art and architecture of the Jews. Never was tree dedicated to more illustrious achitecture than when Solomon sent his four score thousand hewers into Lebanon and covered his Temple "with beams and boards of cedar." And the great king immortalized the tree when he selected as the type of one of his noblest conceptions: "His countenance is as Lebanon, excellent as one of the cedars."

The temple of Diana, at Ephesus, which was 220 years in building, was constructed in its frame and boarding entirely of cedar. It is of this tree that Madame de Genlis says: "The rose will be in all countries the queen of flowers; but among trees the honour of being king belongs only to the ancient and majestic cedar." And so high a place has this tree secured in history, that "the few cedars still remaining on Mount Libanus are preserved with a religious strictness; and on the day of the transfiguration the Patriarch repairs in procession to them, and celebrates a festival called the feast of cedars."

Trees for Inspiration.

The intimate relations which trees bear to remarkable events and illustrious persons are almost innumerable, as you may infer from the few and striking illustrations to which I have called your attention. But these insensible though living companions of man do not stop here. They afford shelter and encouragement to his loftiest aspirations, and offer him protection and sympathy in those hours when his mind is filled with fervour and inspiration. Evelyn says: "Innumerable are the testimonies I might produce concerning the inspiring and sacred influence of groves from the ancient poets and historians. Here the noblest raptures have been conceived; and in the walks and shades of trees poets have composed verses which have animated men to glorious and heroic actions. Here orators have made their panegyrics, historians their grave relations, and here profound philosophers have loved to pass their lives in repose and contemplation." Would you find instances of this in your own day? Attend Hawthorne, then, in his wooded walk at Concord, and learn the height which man's contemplation may reach amidst the whispering silence of the groves; join Thoreau in his forest seclusion, and know the inspiration which belongs to those solemn arches and the leafy chapels which Nature prepares for her worshippers.

Trees for Profit.

And now, to him who, in a spirit of thrift and economy worthy of that people to whom as an American he belongs, would ask what is all this worth? let me say that the judicious selection and planting of trees may be made one of the most profitable branches of agriculture. Not for the beauty of the town alone, but for a thrifty use of remote and deserted acres also may the culture of trees be made a part of the business of life. A venerable clergyman in Massachusetts, the father of one of the most distinguished bankers in Boston, left at his death a large territory of woodland in the town which was blessed with his ministry for more than fifty years, and the profits on this land, which he had purchased at a very low rate at the beginning of his professional service, and which had been devoted to the growth of wood, principally pine, were greater than those realized on lands purchased and sold at the same periods in the most prosperous part of Boston. "We have heard of a gentleman," says the author of Practical Economy, "whose lands were more extensive than fertile, whose practice was to plant fifteen hundred trees, on the birth of every daughter, upon his waste grounds, which were on an average worth one pound each on her becoming of age, thus enabling him to give her a fortune of £15,000 without any extraordinary economy on his part, the regular thinning of the trees at proper seasons, with barking, etc., paying off the current expenses, besides yielding him a small rent for the land." The profits derived from the growing of the pine, the locust, and birch, all capable of flourishing greatly in light and worthless lands, have been in many instances very remarkable. Perhaps I would not recommend the cultivation of wood and timber as a universal branch of agriculture in these days when the secret of the business lies in quick returns and devotion to local markets; but I can find in the experience of those who have tried it an encouragement to those who, by the possession of large tracts of waste lands, may be compelled to follow their example in the business of tree-planting; and I read with profound interest the statement addressed to Governor Foster by an enterprising citizen of this State, with regard to his success in tree planting, and the groves of walnuts, maples and chestnuts which he is cultivating with pleasure and profit.

But more than all this, to the poetic and practical alike I would present the advantage of

Ornamental Gardening,

both in our towns and around our rural homes, and its kindly effect upon the character of those who are subject to its influences. It is an old story, I know—this of the refinement and invigoration which attend pursuits upon the soil—but it is so true and so charming and, I am sorry to say, so little heeded, that it may, if properly told, be repeated a thousand times, and heard with pleasure and profit. The devotion of mankind in all ages to the land is a feature of social and civil history which cannot be lost sight of by him who would trace the steps which man has taken in his progress and development. "To dress the garden and to keep it," was the first duty imposed on man when he entered into his career on earth, and "to dress the garden and to keep it" has been the desire of every man who, after long wanderings, has learned the point from whence all his impulses sprang. The poor man seeks the soil; the rich and the powerful believe in its refreshing influences and its repose. The industrious and frugal mechanics and labourers of our country all toil for a home and a spot which they can cultivate. The merchant of our day, like his ancestor in the early periods of our commercial history, when every man bought a farm, believe now in the delights of rural and suburban life. The law and the custom of our fathers was a land-holding clergy, established for life in their ministrations. From the farms and plantations of the colonies sprang brave and hardy and wise men, who gave us our freedom and our nationality.

I trust, therefore, that to this and to all other associations dedicated to the work of preserving and restoring our vast forest wealth, and of beautifying the earth upon which we tread, the people of this continent will extend a grateful heart and a helping hand.

In conclusion, let me urge upon this Association the most careful consideration of the topics before it—the use of forests; the conservation of forests; the influences, in-

jurious and beneficial of forests; the educational means by which we may become acquainted with Forestry work. To what extent can the land-owner enter profitably upon the business of tree-planting and forest culture? What legislation can the States best adopt for the increase and preservation of their forests? How shall the General Government provide for the planting of forests on its public lands? What is the precise extent of forest waste? What is the comparative value of various timber trees? How shall we secure wind-breaks on the prairies? By what chemical processes can we preserve our timber used in building and fencing? What forest trees are best adapted to various localities?—these are questions which should be answered as definitely as possible. They are questions which the American people are anxious to have answered, and before which all discussion of foreign legislation, all consideration of the value of wood products, all statistics of trade, all study of land tenure, sink into insignificance. I trust the deliberations of this convention will point the way by which these problems can be solved, and by which our vast forest wealth can be economically preserved and profitably used.

At the close of this eloquent address, which was listened to with marked attention throughout, the orchestra provided for the occasion furnished some excellent music, closing with "God Save the Queen."

April 26th.

The Congress commenced at 10 a. m.

The following communication from Richard Von Steuben, Royal Chief Forester of the German Empire, was read.

FALKENBURGH, near Dommitzsch, District of Torgau,
March 11, 1882.

MOST HONORED SIR,—I thank you most sincerely for your cordial invitation to the opening exercises of the National Forestry Association. It is, however, to my greatest regret, impossible for me to accept the same. Irrespective of all personal considerations, I am bound here by the onerous duties of my position as an officer of the King; for a trip so far and time consuming, I would have to crave leave of absence of the Minister, which I cannot do so soon after the long leave of absence given me last fall, especially not during the planting season, when the superintending officer can least be spared.

I regret most exceedingly that I cannot attend the opening exercises, since it is certain that your Association will be productive of much good to the whole country. During my stay in the United States last fall I had occasion to discuss the question of the rapidly growing necessity of introducing a regulated Forest Government in order to prevent future calamities which must undoubtedly result from a reckless destruction of the forests. Even the Honorable Secretary of the Interior, at Washington, honoured me with a consultation on the subject.

There can be no doubt that every country requires a certain quantity of well stocked woods, not only to supply the demands for building material and fuel, but more especially to secure suitable meteorological conditions, to preserve the fertility of the soil, and out of sanitary considerations. The ratio of the minimum quantity and judicious local distribution of the indispensable forest to the aggregate area cannot be expressed by a universal rule, but the same can only be approximated by scientific investigation. Above all things, it is essential to prevent forest destruction where such would injuriously affect the fertility of the soil. It is important, then, to preserve and to cultivate judiciously those forests which stand at the head-waters and on the banks of the larger streams, because through their indiscriminate destruction fluctuations in the stage of water, sandbars, and inundations of arable lands are occasioned. It appears also necessary to preserve and properly to cultivate woods in quicksands, or the summits and ridges, as well as on the steep sides of mountains, along the sea coasts, and other exposed localities.

In Germany, and especially in my more narrow bounded fatherland, Prussia, it is regarded as of the greatest importance, not only to preserve the forests already there, but to extend them as much as possible.

In the National Appropriation Bill large sums are set apart for the purchase of such lands as are unfit for cultivation, and for utilizing the same by planting trees.

In the Germam Empire 25.7 per centum of the aggregate area is occupied by forests —that is, 13,873,065 hectares out of 53,974,041 hectares. In Prussia the percentage of wooded land is 23.4 per centum of the entire area—that is, 8,124,520 hectares out of 34,750,903 hectares. Of the Prussian forests about one-third belong to the State, to wit, 2,648,892 hectares, which produce a gross income of about fifty-five million marks, or a net income of about twenty-five million marks. The Government foresters come within the province of the Minister of Agriculture and Forests. At the head of this department is the Chief Master of the Forests; in each governmental district is the Forest Master, who serves as a member of the Governmental Commission, and the entire forest area is divided into 680 principal forest districts. Each forest district is separately valued, and for each separate part regulations are devised, which are strictly followed, thus attaining the chief object, of so regulating the annual amount of wood-cutting that a continuous gain in material and money is secured, and even increased. The forest government is devised with the minutest detail, and may well lay claim to being termed exemplary; it strives not only to utlilize the forest as a source of income, but rather are the Government forests used to continually satisfy the requirements of the country.

In order to obtain a situation as a Government officer of the forests, a course of study of several years at the Forest Academy is required. After which follows about ten years' preparatory service before a definite engagement can be made, the qualifications for which must be proved by several examinations even for the minor positions in the Forestry Department; several years' apprenticeship and considerable preparatory service connected with the military service in the Hunters' Corps, and two examinations are required. Besides the real Government forests there are the Forests of the Faithful Royal Veterans, Community Forests, Corporation Forests, &c.

The Forests of the Faithful Royal Veterans are governed entirely according to the principles of the State Government. The State exercises a supervisory power over the other forests named, so that even as to these a regulated system of government prevails. It is otherwise with forests owned by private individuals, for they are not restrained in the use of their forests, and may, according to their own judgment, clear the same and till the soil, in short, do what they like, and yet there may be certain restrictions placed on the free use of the same as soon as danger to the common welfare is feared; these restrictions are prescribed by the law of July 5, 1875, relative to forest protection.

This law is applicable in cases:

1. Where by reason of the sandy nature of the soil, adjoining lands, or public grounds, natural or artificial courses, are in danger of being covered with sand.

2. Where through the washing away of the soil or through the formation of cascades in open places on the ridges of hill and on hillsides, the arable lands, streets or buildings living below are in danger of being covered with earth or stone or of being flooded; or the lands or public grounds or buildings lying above are in danger of sliding.

3. Where through the destruction of the forests along the banks of canals or natural streams riparian lands are in danger of caving, or buildings hitherto protected by the woods are in danger of iceflows.

4. Where through the destruction of forests rivers are in danger of a diminution of the stage of the water.

5. Where through the destruction of forests in open places and near the lakes, neighbouring fields are seriously exposed to the detrimental influences of winds.

In the cases above mentioned, which have been copied *verbatim* from the statute book, the manner of use as well as the culture of forests may be legally ordered, in order to prevent those dangers where the dangers to be averted are considerably in excess of the damages which would result to the owner by reason of the restrictions.

Excepting the restrictions prescribed by this law, the owner may dispose of his woods as he pleases.

Finally, permit me to remark that the larceny of wood and other products of the forests is punishable according to a law of April 15, 1878.

It is evident that these Prussian regulations are not all applicable to the United

States, as circumstances are so entirely different there. Unfortunately I am not sufficiently familiar with them to venture an opinion as to judicious measures to be taken for the protection of the forests, and it would have given me great pleasure to have informed myself on the grounds and to have taken part in the deliberations.

I trust you will grant me the favor to inform me of the result of your sessions, and consider me always ready to give all desired information concerning, as well as our forest arrangements, as our usual mode of planting and cultivating trees; indeed, to give information of all kinds and at all times.

Permit me now, my dear sir, to thank you most heartily for your friendly invitation and to express my sincere regrets at my inability to accept the same. Give my kindest regards to the gentlemen of the committee. I wrote to Mr. Adolph Strauch a few days before the receipt of your letter. I thank you for your friendly wishes, and return mine most heartily.

I am, with greatest respect,

RICHARD VON STEUBEN,
Royal Chief Forester.

The first paper read was from the venerable James Little of Montreal, Canada, which is as follows:—

While my efforts have been mainly directed toward the protection from destruction of the forests of white pine, it has been painful to me to witness that our other commercial woods, such as walnut and oak and ash, are nearly all gone, and our pine, spruce, birch and tamarac are following so fast that we will soon have nothing left of commercial value.

I know that the idea prevails on the American side of the line that the area of timber land in Canada is so great that the supplies are practically exhaustless; but this idea, I regret to say, is not borne out by the facts. The best authorities state, and I believe it true, that ten thousand millions of feet, board measure, will comprise all the merchantable pine of the Provinces of Ontario, Quebec, New Brunswick and Nova Scotia; and, as we are drawing from these points over one thousand millions annually, less than ten years will, unless the production be curtailed, use up our whole stock.

As to the pine of Newfoundland, a fair amount of pine is yet standing in that Province, and the same may be said with regard to the territory adjoining the Hudson's Bay. It has not been satisfactorily explored, but what little is known of it does not warrant us in anticipating any great amount of valuable timber from that region; and whatever supply there may be will go but a short way to meet the wants of the settlers who are flocking into the treeless prairie country lying to the west of it.

The Province of Quebec possesses an aggregate of about 5,000,000,000 feet, Ontario 3,500,000,000, New Brunswick 1,500,000,000.

Whether the amount may exceed this estimate, which I have gathered from the best sources of information attainable, or not, there is one thing sure, that our magnificent forests of pine are about all gone, and the remark of Mr. Charles Gibb, "that our native white pine may yet be peddled in some parts of our country as a rare exotic, so scarce has it become," is certainly to be realized in the near future.

New Brunswick, that a few years ago sent the finest quality of pine to England, can only now ship a quality that realizes the same price as spruce, and the great Ottawa rafts that used to average from eighty to one hundred cubic feet per stick are now made up of pieces of which an average of fifty feet is only obtainable by culling over a large extent of territory. In fact, the size of the timber is so reduced that in Britain they are forced to buy our pitch pine of the South of the United States to get large-sized timber, and the sizes of the logs now made are so small that at an informal meeting of manufacturers of deals for the English market, held in Quebec, the subject was seriously discussed of reducing the size of stocks for pine deals from the present standard—eleven inches in width—to nine inches, the same as the spruce deal.

In point of fact, we are following the United States very closely in our efforts to get rid of our forests, and fully justify the remarks of a Glasgow journal that "Canada and the States are busy sawing from under them the high-reaching fortune-making branch on which, like conquerors, they are now sitting and overlooking the world."

I hardly dare attempt to describe the consequences of a dearth of timber, and every effort should be made not only to protect our existing forests, but to plant new ones, for no civilized country can do without timber. Even Great Britain, that is supposed to be finished up and requiring, as it were, only timber for repairs and that is enabled to obtain supplies at the cheapest rate from the north of Europe for the bulk of her wants, has to pay from $75,000,000 to $100,000,000 yearly for wood. What it would cost your country, which is yet to be built up, and consumes probably five times as much, can hardly be estimated, but this I am sure, that it would cost the United States more than its whole exports of grain and cotton and require the combined sailing tonnage of the world to procure it from any source known to me. In fact, dearth of timber reaching the industries of the United States and Canada, which is sure to take place before many years roll round, is one that can not be contemplated without the most painful apprehensions for the future of both countries.

In conclusion, I do not see that I can add any better advice than that of the Laird of Dumbiedykes to his son and heir: "Jock, when ye hae naething else to do, ye may be aye sticking in a tree; it will be growing, Jock, while ye're sleeping."

Mr. N. H. Egleston, of Williamstown, Mass., then addressed the meeting as follows:

I find myself here in a double capacity. As a delegate, invited by you as such, I have to thank you for your courtesy in inviting me, so far away from your place of meeting, and a stranger, to be with you and to take part in your important deliberations.

But I am here also in another capacity. I come with this commission from His Excellency, Governor Long, issued in conformity with the vote of the Legislature now in session at Boston, to bring to this Convention the salutation of the State of Massachusetts, and, so far as my poor abilities will allow, to represent the ancient Commonwealth on this occasion. I am here because Massachusetts is, and always has been, interested in whatever is of importance to the country at large. She counts herself a member of the living body politic of this great nation, and recognizes the truth that whenever any member of the living body suffers all the members suffer with it, and whenever any member rejoices, all the members rejoice with it.

But Massachusetts has not merely this general interest in the subject which has called this Convention together. She knows by practical experience the importance of preserving our forests. When the Pilgrims sighted Provincetown, and coasted along Cape Cod to lay the foundations of an empire, that great arm of land, as well as Nantucket and other islands on the south, was covered with a stately forest growth. But with the progress of settlement on those coasts, what has been done by man almost uniformly as he has migrated from the original cradle of the race in Asia Minor, was repeated. The forests were recklessly cut off, and the land became a desert waste of sand. So barren was much of the region made that the dwellers there have, in many cases, carried soil from the main land over leagues of intervening water in order to secure a proper return of crops from their seed-sowing. But now, in these later years, these barren stretches of sand are being reclaimed. All along that exposed coast, from the point of the Cape to Martha's Vineyard, may be seen plantations of forest trees, many of which have attained a growth sufficient to furnish marketable timber, while many others, more recently planted, are making effective wind breaks for the ordinary crops of the farm, thereby increasing the value of the land for tillage purposes.

But Massachusetts has other portions of her soil besides her sea coast, which makes the subject of forestry one of direct interest to her. From her eastern to her western limit she has tracts of rocky and mountainous character, or low and swampy districts, which are unfit for ordinary cultivation, and, in an agricultural point of view, almost valueless. But, planted and protected as woodland, these tracts may become of very great importance as a source of direct pecuniary return, as well as on account of their bearing upon the climate, health and the various economic industries of the people. The

State is turning her attention very earnestly to these waste and comparatively unprofitable portions of her territory. Bills are now pending before the Legislature looking to the adoption of measures for bringing the active and intelligent aid of the State in planting and protecting these waste lands.

I may mention also that several years ago our Society for the promotion of agriculture issued circulars on the subject of forest culture, and offered premiums for the encouragement of tree-planting on the large scale.

In the Arnold Arboretum also, at Brookline, Boston, under the charge of Professor Sargent, Massachusetts has a Forestry School, at least in embryo, and a garden of acclimation, where already are gathered thousands of trees from all parts of our own country and from the other side of the Atlantic, with a view to the practical study of their growth, and their adaptation to different soils and climates.

By its publication also the Arboretum has diffused throughout the country much valuable information in regard to tree culture, and influenced the legislation in several of our States upon this important subject.

Professor Sargent, as many know, is also charged with the preparation of the census returns in regard to the forests of the country. In discharging the duties of this office he has made, with the aid of a competent corps of assistants, a more comprehensive and careful survey of the timbered portions of the country than has ever been made before. Specimens of the various woods of the country have been gathered and a great deal of information in regard to their habits of growth and value for different purposes. Maps have been constructed showing the amount of timber that has been cut off, and the amount now standing in each State and Territory. Maps have also been constructed which indicate at once to the eye the extent of forest destruction by fires.

The remainder of the day was devoted to the reading and discussion of papers.

April 27th.

This day which was specially set apart for tree-planting, and designated as arbor day, was opened by a general session of the Congress, at 9 a.m., when Dr. Franklin B. Hough, Chief of the Forestry Division of the Agricultural Department at Washington, read a paper on "The Forestry of the Future," which was followed by one from David H. Bailey, late Consul-General of the United States in China, upon "The Droughts, Famines, and Floods in China." After some discussion on these papers the meeting adjourned.

In the afternoon the Congress took part in the holiday procession and general tree-planting which characterises arbor day. The day was kept as a general holiday by the citizens, the public buildings, and many of the places of business were gaily decorated, and an immense procession formed, which, accompanied by bands of music, proceeded to Eden Park, where trees were planted in honour of presidents, authors, pioneers, soldiers, sailors, etc. Trees were also planted in honour of Queen Victoria and Princess Louise.

The tree-planting ceremonies commenced with the firing of a signal gun and closed with the firing of a second gun, when the vast assemblage and the speakers proceeded to the grand stand, where President Loring addressed the vast audience in the following strain: He spoke of himself as a stranger in a strange land where he had been elevated to the high position of President of the American Forestry Congress. He said:

"We are now all better acquainted with each other than we were. We have awakened to a common interest. The forests are mutely appealing to us for aid against the hand of the destroyer, and they should and will be helped by the American people.

"After listening to the learned papers of the Convention, we are practically carrying out the theories by planting trees that will stand as monuments to the great men who founded the United States. We began with Columbus, who explored and reported back to Spain the discovery of a virgin country. Next we planted to the memory of a long line of citizen magistrates unequaled by any line of Kings. Among these magistrates we have George Washington, who first, as a surveyor, trod the forest, and afterwards led

the armies of the Revolution through mighty storms to a conclusion that gave us a free and united country.

"Beginning with him, we have an illustrious list. Thomas Jefferson, who said all men are born free and equal; the inalienable rights of all men are these: life, liberty, and the pursuit of happiness; he it was who taught nations that all men could come here and be protected under the flag of freedom. Nor should we forget Abraham Lincoln, who laid down his life for the Nation, but not until he knew that loyal soldiers had saved the Nation.

"Passing on, we come to an example of truth and fidelity that Ohio should never forget—James A. Garfield. Where is there a mound more sacred than his? Having done all this, we must remember the country from which we sprang—Mother England. One tree to the Queen, and one to the royal family, and for them and their country we ask continued prosperity."

The next speaker was Cassius M. Clay, who said:

"All of you who have read history—and who has not?—will have your hearts and minds reawakened to the beauty and appropriateness of this scene, in which so much is said and done to the memory of the great of our land—nay, of the distinguished in distant lands. I have had the great honour of dedicating a tree to Christopher Columbus, our country's discoverer, and I appreciate that very great honour."

Several other distinguished speakers also addressed the audience.

The occasion was one of unusual interest. Eden Park presented a beautiful appearance with its groups of men, women and children in their holiday attire, scattered about over its undulating surface, gathered as their inclination led them—some to the grove in memory of the Presidents of the Republic; others to that which commemorated her men of letters, or her brave soldiers fallen in battle, or the early settlers who laid the foundations of empire amid the primeval forests. The fresh verdure of advancing spring gave a charm to the ever-varying landscape, and the stirring strains of martial music blended harmoniously with the hum of merry voices.

It was a happy thought thus to attract public attention to an important, but hitherto unconsidered, subject; to associate in the public mind the planting and conservation of trees with honoured names and historic events; to woo the weary artisan from his work-shop, the merchant from his ledger; to call out the children from the schools, and the ladies from their houses, and bring them into the groves to make a festal day and gain perhaps their first thought of forestry amid scenes of joy and merry-making, intermingled with eloquent addresses and soul stirring music.

The setting apart of a day in the early spring time for the planting of trees in public parks, on the streets and avenues of our towns and cities, and along the sides of country highways, in which the planting takes place in connection with such social enjoyments as make the day one of pleasant recreation, is a means of attracting public attention, and of creating a public sentiment in favour of the culture that deserves careful consideration.

Closing day brought the proceedings at the park to a termination, and in the evening the members of the Forestry Congress were invited by the ladies of Cincinnati to a reception in Music Hall, in which song, and speech and instrumental music were most happily blended, the utterances all tending to keep in mind the subject of forestry in one or another of its various aspects, and to fasten it in the memory with pleasing associations.

April 28th.

The Congress met at nine o'clock in the morning in Dexter Hall, and decided that the next meeting should be held at Montreal, Canada, on the 21st and 22nd of August, 1882.

The Canadian delegation expressed their thanks to the Congress for the honour conferred in appointing the next meeting to be held in the Dominion, and for the very kind invitation which had been extended to Canadians to participate in the deliberations of this meeting. "We have," said the speaker, "been so cordially welcomed, made the recipient of so many delicate attentions, and have enjoyed so much instruction, that we

could not leave, as we shall be obliged to do this evening, without taking an opportunity of expressing our thanks.

"It has been a serious problem with us how to interest the general public in the subject of forestry, so as to secure the preservation of what yet remains, and the replanting of places that have been needlessly denuded of trees. But you have taught us a lesson we shall strive to learn to our profit. Yesterday will not soon be forgotten by us. You have brought out your senators, legislators, governors, lawyers, clergymen, merchants, and artizans, your wealth and beauty, to celebrate the planting of trees and lend their influence to the promotion of the objects of your association.

"We thank you also that you propose to hold your next meeting within our Dominion. We shall be glad to welcome you and to show our gratitude by our works on that occasion. I know that the residents of Montreal will exert themselves to make your sojourn with us pleasant, and will give you a most hearty welcome."

The day was fully occupied in the reading and discussion of many very interesting and valuable papers on the *relation of forests to water supply*, the *profits of durable trees* the *insect enemies of trees*, etc.

The Forestry Congress adopted a resolution, with instructions that the same be forwarded to the President of the Senate and the Speaker of the House of Representatives, requesting the Congress of the United States to establish at the several agricultural institutions, both state and national, experimental forestry stations, to be conducted on the same general principles as adopted in Germany.

A committee was appointed to report at the next meeting upon the practicability of securing the appointment by the respective states of Forestry Commissioners; such committee to consist of Dr. F. B. Hough, Cassius M. Clay, Dr. J. A. Warder, Wm. R. Lazenby, Wm. J. Beal, Prof. Jas. F. Stafford, and C. S. Sargent.

Also a committee composed of Prof. Mohr, Wm. Little, Horace Wilson, O. N, Eglesston, Henry C. Signer, and R. C. Kudzie, to report upon practical measures to prevent the continued destruction of forests by fire, and the inroads of cattle.

In the afternoon some of the delegates attended at Lincoln Park to participate in the tree-planting exercises there. On this occasion Mr. Emil Rothe delivered an address so full of instruction and timely warning, that we here present it for your perusal. He said:

"Nature is the enemy as well as the friend and nurse of man. Every progress in culture and toward comfort is the result of man's combat against wild nature. His first elevation over the animal, the construction of a dwelling better than a cavern or a hollow tree and the procurement of the most primitive clothing, necessitates destruction of vegetable and animal life. The establishment of even the rudest home requires the felling of trees, or at least the cutting or breaking off of branches, and agriculture commences with destruction of the original vegetation and with tearing up the virgin soil. In the struggle with nature the physical and mental qualities of man are put to the first test. Contemplation of nature and observation of its laws are necessary to find means for aggression and defense. The multitudes of people are raised on the open plains, while the men of strong body and mind come from the forests and mountains, where nature offers the most obstinate resistance. Bnt when that grade of culture is reached where a man learns to put the powers of nature to his use, it should be supposed that he would then begin to appreciate the value of animal and vegetable life, and use the gifts of nature with some consideration of the laws of their reproduction and with some sense of economy and saving for the future; but reckless selfishness and the spirit of destruction seem to be stronger in him than reason and forethought.

"History establishes the strange fact, that until a very recent period nearly all civilized nations have very imprudently and often wantonly wasted the natural resources of their respective countries, until the greatest part thereof was exhausted beyond the possibility of reproduction. They all knew well enough that forests were indispensable, they judged from the commercial as well as the æsthetical standpoint of view, but they made no efforts to preserve, much less reproduce them. Even the high cultivated Romans, who could not have failed to be aware of the final consequences of the destruction of the forest, which was steadily going on in the so-called classical period, never took pains to replace the rapidly disappearing native trees.

"In ancient times forests were in some instances preserved and extended by means of systematical planting of trees in East India and in Persia, either to serve the purposes of anchoretic Hindoo priests or as hunting grounds for the princes. The famous *paradasos* which Xenophon praises for their grandeur and beauty, were in fact nothing but the well-kept game-parks of the kings and satraps of Persia. Likewise the abundance of natural timber in some parts of Germany may to some extent be ascribed to the hunting passion of the princes and noblemen, who in early times took possession of the forests and protected them and the game therein contained against trespass by rigorous and often extremely cruel laws. Though it was in Germany, noted for the inclination of its people to contemplation, thinking and economy, where the idea to preserve existing forests and to create new ones by systematic planting, was first conceived and practically carried out for general public purposes.

"For more than a century forestry has been recognized there as a science, a profession and a regular branch of the public administration. Frederick II., one of the wisest kings that ever sat on a throne, gave it every possible aid and encouragement, well knowing that the systematical culture of forests would greatly contribute towards the general welfare of the country, and by-and-by become a source of a regular and large revenue. The experience of a hundred years has fully endorsed the philosopher of Sans-Souci. Unlike too many other countries, in which an alarming deterioration of the soil and climate is only too clearly perceptible, Germany has gained in fertility; vast tracts of formerly worthless land, such as the Limburgher Haide, the sandy districts of the Lausitz and Altmark and the swamps on the Wartha and Vistula Rivers have been converted either into grain fields or meadows, or into well-stocked forests. Some writers pretend that the climate of Germany has actually improved, but so much is certain, that it has not changed for the worse. It is generally conceded that were it not for the wise preservation of the natural growth of timber and for the extensive cultivation of natural forests, Germany, a country of far less natural resources than either France or Spain, could not sustain fifty millions of people, perhaps not half that number.

"Other gentlemen of better learning and better versed in the sciences of meteorology and climatology have, at this occasion, in detail explained the importance of forests as attractors, moderators and preservers of humidity, as regulators and equalizers of the temperature, as protectors and fertilizers of the soil, as purifiers of the atmosphere, as distillers of ozone, and as the subject of æsthetical and poetical contemplation. My remarks will be confined to facts established by history."

Palestine.

"At the time when Joshua conquered the Promised Land milk and honey were flowing in Canaan, that is, it was a country of wonderful fertility, blessed with a delightful climate. Both ranges of the Lebanon and its spur mountains were then densely covered with forests in which the famous cedar predominated, that stately tree so masterly and poetically described by the Psalmist and by the prophets. The large and continually increasing population of Palestine enjoyed comfort and abundance during many centuries. But a gradual devastation of the forests, which was finally completed by the Venetians and Genoese, brought about a general deterioration of the country. The hills of Gallilee, once the rich pasturing ground for large herds of cattle, are now sterile knobs. The Jordan became an insignificant stream, and the several beautiful, smaller rivers, mentioned in the Bible, now appear as stony runs leading off the snow rainwater, but being completely dry during the greatest part of the year. Some few valleys, in which the fertile soil, washed down from the hills, was deposited, have retained their old fertility, but the few cedar trees remaining as a landmark around the Maronite convent on the rocky and barren Lebanon, look lonely and mournfully upon an arid and desolate country, not fit to sustain one-sixth of such a population as it contained at the time of Solomon."

Greece.

"What became of Greece, beautiful Greece, where in the enjoyment of an eternal spring, gods, demi-gods, heroes and men used to pass their happy time in comfort and

idyllic contentment. Mild zephyrs gently moved the glossy leaves in the vast forests, wherein fawns, satyrs and nymphs joined in frolicsome dance. Umbrageous groves overshadowed the silvery springs on the verdant shores of which Pindar and Sappho listened to the sweet song of the nightingale. The poetical disposition of the Greek people led them to contemplation and love of nature; their religion was based upon personification of the latter. Each species of tree was dedicated to a certain god; the oak to Zeus, the spruce to Poseidon, &c. In all parts of the country were sacred groves. In every tree the dryad, an elf-like being, was supposed to live; the flowing sap of a wounded tree was the blood of the dryad, who died with the tree. There was no waste of the forests in the classical period of Greece. They were destroyed in later centuries. The gods and goddesses, majorum and minorum gentium, have disappeared with them. Instead of balsamic zephyrs the icy boreas and the suffocating south wind blow unhindered over the parched fields of Attica and over the barren hills of the once paradisaical Arcadia, now thinly populated by a poor and degenerate people."

Spain.

"Under the reign of the Moorish Caliphs the Iberian peninsula resembled a vast garden, yielding grain and fruit, of every known variety, in the most perfect quality, and in endless abundance, and thickly populated by a highly cultivated people. But then the sierras and mountain slopes were covered with a luxuriant growth of timber, which was afterwards wantonly destroyed under the rule of the Christian Kings. Large herds of half-wild goats and sheep prevented the spontaneous growth of trees on the neglected lands. Now nearly all the plateau-lands of Spain, being fully one-third of the entire area, are desert-like and unfit for agriculture, because of the scarcity of rain and the want of water. Another one-third of the territory is covered with worthless shrubs and thornbushes, and affords a scanty pasture for the merino sheep: the number of which is decreasing from year to year. The once delicious climate has become changeable and rough, since there are no more forests to break the power of the scorching Salano and the cold Galego wind. The average depth of the fine rivers that cross Spain in all directions has greatly diminished. The Government well aware of the causes of the deterioration of the soil and climate, has lately made earnest efforts, partly to replant the old forest grounds, but has met with little success, it being very difficult to make trees grow on former timber land, which has been laying waste for a longer time. It will take a full century's time and necessitate an immense outlay of money to restock Spain with sufficient timber."

The Eastern coast of the Adriatic Sea.

"On the entire eastern coast of the Adriatic Sea, in Dalmatia, Herzegovina, and Montenegro, the same evil consequences of the devastation of the natural forests are clearly perceptible. These coast lands were very fertile until the Romans, having used up their own timber, took it from the other side of the Adriatic, and until millions of Illyric trees were converted into pillars and rammed into the lagunas to make foundations for the houses, palaces and churches of Venice. What was left by the lumbermen was destroyed by the camp-fires of careless herdsmen, and here also the goats did their pernicious work in preventing spontaneous growth. The long mountain range running along the coast, which was yet well timbered in the time of the great Constantine, is now destitute of all soil; the naked lime-roads, reflecting the hot rays of the sun, warn the stranger not to enter the sterile and inhospitable country hardly worth the loss of human life and treasure which the subjection of its unruly inhabitants now costs the house of Hapsburg."

Sicily.

"Let us look at Sicily, once the great grain reservoir for Rome. Since the island of plenty was despoiled of its forests, it gradually lost its fertility and the mildness of its climate. The ruins of proud and opulent Syracuse lay in a desert, covered by sand, which the hot sirocco carried over the Mediterranean Sea from Africa. A few isolated, well-watered and carefully cultivated districts of very limited extension, is all that is left to remind the tourist of the by-gone glory of Sicily."

Italy.

"When the Appenine and Sabinian Mountain range and its slopes were covered with its natural growth of trees, the now detested Roman Campagna, and the largest part of the Pontine swamps were a beautiful section of country. They were then adorned with the sumptuous summer residences, villas, parks, flower and fruit gardens of the Roman aristocrats. After the destruction of the forests, the whole region became unhealthy, and almost absolutely uninhabitable, on account of the malarious gases emanating from the soil. Formerly these were absorbed by the leaves of numerous trees, now they fill the air and infect even the very heart of St. Peter's eternal city."

France.

"The devastation of the forests which took place in France towards the end of the last century, caused the impoverishment of several formerly fertile districts in less than a quarter of a century. The French Government has lately adopted a regular system of forest planting, which proves a great success, and which in the course of time will undoubtedly repay the great expense already incurred, and yield a large revenue to the public treasury."

America.

"We Americans boast of inexhaustible natural resources. Our speculators and vain glorifiers ridicule the warnings of thinking men and political economists. They point to the extensive timber regions in the unsettled parts of the country, in which even now the trees are really an impediment to cultivation. But the supply of lumber and the existence of large timber districts in distant territories is not the only desideratum. It is certainly no equivalent for the want of it in the early cultivated States. The equal distribution of the forests over the whole country is what is needed for the preservation of comfortable climate and fertility of the soil."

Ohio.

"Let us look a moment at our own State of Ohio. 'As long as we and our children and grandchildren may live, lumber will be obtained for a reasonable price from Michigan and Canada, if our own supply should give out.' Such is the argument of the short-sighted men who value the tree solely by the quantity of cubic feet of lumber that may be cut from it.

"That is the consolation of the all-grasping and swallowing speculator, who gets angry when looking at the moon, because he can not take it down from the sky, bring it before a circular saw, cut it to pieces, and sell it at the exchange or in the market by the yard or pound. Now, have you never tried to find out why Southern Ohio has ceased to be the great fruit country, *as it was formerly known?* Why is it that we can not raise any more peaches in our State, while they used to bring sure crops not more than a quarter of a century ago? Why is it that even the hardy native Catawba grape, which used to yield so abundantly in this region, does now hardly pay for its cultivation? What is it that makes our climate, once so favourable for mankind and vegetation, more unsteady from year to year? Look at the woodless hills of Southern Ohio, and you have the answer. Let the hills be deprived of all the rest of the protection which the forests afford, and half of the area of this State will be sterile in less than fifty years. The rain will wash the soil from the hill-tops first, and then from the slopes; the limestone, which is now covered with productive humus, loam and clay, will be laid bare; the naked rocks will reflect the rays of the sun and increase the summer heat; the north storms will blow unhindered over the country, and every change of the wind will cause an abrupt change of the temperature. The rainfall will be diminished and become irregular. Snow and rain-water will at once run down in the valleys and cause periodical freshets, which will ultimately carry away the best part of the soil, even from the valleys. Such will be the unavoidable result of further devastation of the timber."

The Northwest.

"I had an opportunity to observe and study this result in the Northwest. Thirty years ago steamboats drawing six feet of water, made regular trips on the Upper Mississippi up

to St. Paul. Now the navigation with boats of half that draught is uncertain enough. Nearly all the tributaries of the Upper Mississippi have also lost one-half, or even more, of their former supply of water. Inundations in the spring are now frequent, while now in the summer time the depth of many of these rivers average hardly more inches than it could be measured by feet thirty years ago. Water powers, which were formerly deemed to be inexhaustible, have entirely been abandoned, or their failing motive power has been replaced by steam. In the remembrance of the older settlers the climate of Wisconsin and Minnesota was remarkably steady, the winters were long and cold, the supply of snow ample and regular, and late frosts in the spring were unusual. Now the inhabitants complain of abrupt changes of the temperature in all seasons of the year, and of the irregularity of the snow-fall. The Legislature of Wisconsin has already paid attention to these alarming facts, and has taken the preservation of existing forests, and the establishment of artificial ones, in earnest consideration. By a resolution recently passed, it asks of the National Government the transfer for that purpose, of all unsold public lands to the state, which are now despoiled of their timber by thievish lumbermen."

Arizona.

"In the Territory of Arizona an immense number of deserted Indian dwellings carved out of the rocks were recently discovered. The former inhabitants of the same must necessarily have been a sedative people, devoted to agriculture, but the whole district is now desert like, there being no supply of water, and hills as well as plateaus and valleys being dry, stony and nearly destitute of vegetation. This can not have been the condition of that district when it was densely populated by hundreds and thousands of Indians. Now the only plausible solution of the ethnographical enigma which is here propounded to us, is the following: The hills and slopes there were once stocked with lumber, which was wasted by the inhabitants, whereafter the same deterioration of the country gradually took place which we notice in Palestine, Greece, and Sicily, and finally the people had to emigrate to avoid starvation.

"But enough of the warning examples of history.

"It is not too late for repairing all the damage that has been done in America by the devastation of our natural forests. A regulation of the use of the timber may be effected without any injury to the legitimate lumber trade, and the replanting as well as the establishment of artificial forests, may undoubtedly be made profitable for private as well as for public enterprise. If it is remunerative to acclimatize and extensively raise American trees in Germany and France, where the soil is much higher in price than here, why should it not be lucrative to cultivate them in those parts of the United States in which the timber is scarce and precious? They grow quicker here and to greater perfection than anywhere else. Nature has lavishly provided this country with an uncommonly large number of the most valuable species of trees. There are not more than thirty-five species and distinct varieties of native trees in France which attain a height of over thirty feet, not more than sixty-five in Germany, but over one hundred and fifty in the upper part of the Mississippi Valley alone. All Europe possesses not a single native walnut tree. (The so-called English walnut is of Asiatic origin.) We have nine varieties of hickory and two of walnut proper. You may search all the world over in vain to find a sort of timber which, in general usefulness, could rival with our hickory tree. Our walnut and oak varieties alone outnumber all the varieties of trees native to France and Spain.

"A benign nature has lavishly provided for this country; but does that give us a right to waste these blessings, destined for the human race of all future ages, within the short life of a few generations, like spendthrifts? Shall we adopt the most detestable motto of a modern Sardanapalus, '*Après nous le déluge!*'—anticipate everything and leave nothing for those who will come after us? Will America's pride bear the humiliating prospect that the immense work of culture, which so far has been achieved in this country by the most intelligent, independent, progressive and energetic of all Nations, shall soon be frustrated by the unavoidable consequences of our greedy mismanagement of the natural resources of our country? Shall the future of this great Republic be made uncertain by a gradual deterioration of soil and climate, or shall it forever remain the happy and comfortable home of the free? Is not the care for future generations one of

the most solemn duties imposed upon us by laws of humanity and morality? Are we worthy to enjoy the bequest of our forefathers if we are not just and liberal enough to provide for our descendents?"

Such were some of the prominent features of the first session of the American Forestry Congress, held in Cincinnati, in April, 1882. It is evident that thinking men believe that it is now high time to pause and consider what the destruction of the forests by the axe of the lumberman and settler, and by the yet more extensive and deadly sweep of forest fires, is rapidly bringing us; and whether means may not now be devised to regulate the cutting of timber and prevent its waste by fire, so as to prevent the disastrous results which the denudation of the country would soon bring to pass. Judging from the tone of the remarks and suggestions made, it would seem to be the general impression that the first step to be taken towards the accomplishment of this very desirable object, is to create an enlightened and healthy sentiment on the whole subject of forestry by the dissemination of correct information, thereby awakening attention and convincing the public mind of the necessity and benefit of preserving our forest wealth from destruction.

This important subject will be more fully discussed after the report is given of the second meeting of the American Forestry Congress, held in Montreal.

Respectfully submitted.

WM. SAUNDERS,
D. W. BEADLE,
WM. BROWN,
} *Delegates.*

REPORT OF DELEGATION APPOINTED TO ATTEND THE AMERICAN FORESTRY CONGRESS HELD IN MONTREAL, PROVINCE OF QUEBEC.

To the Honourable the Commissioner of Agriculture:

SIR,—The delegation appointed by you to represent the Government of Ontario at the meeting of the American Forestry Congress, held in Montreal, August 21st—23rd, 1882, beg to submit the following report:

We arrived at Montreal in time to be present at the opening of the Congress, and to greet many of the gentlemen who were present at the session in Cincinnati, and other distinguished gentlemen interested in the subject of Forestry, as they gathered at the commodious rooms, No. 132 St. James street, provided by Mr. Little, Chairman of the Committee of Management.

The Forestry Congress began its opening session at two o'clock on Monday afternoon.

In the absence of the President, the Hon. H. G, Joly, one of the Vice-Presidents, was requested to act as temporary President of the Congress.

Over two hundred gentlemen were present, comprising, besides members of the Congress, many of the leading citizens of Montreal, with several influential gentlemen from other parts of the Province and Dominion.

Mr. C. E. Belle, Crown Timber Agent for the Province of Quebec, offered for the inspection of the Congress, a box containing forty-four specimens of Canadian wood, natural on one side and varnished on the other. They were greatly admired by those present.

The following is a list of papers entered on the programme:

1. Forest Fires.....Joseph S. Fay, Wood's Holl, Mass.
2. The Distribution of Hard Wood Trees in the Gulf Region of the Southern States.....Dr. Charles Mohr, Mobile, Ala.
3. Tree Planting by Railroad Companies, Franklin B. Hough, Ph.D., Lowville, N. Y.
4. The Rational Method of Tree Planting..N. H. Egleston, Williamstown, Mass.
5. The Russian Mulberry.....D. C. Bunson, Topeka, Kan.
6. The Larix Europea (European Larch), its quick growth, adaptability, propagation and culture.....David Nicol, Cataraqui, Ont.

7. The Coppice for the Village and Town.....M. C. Read, Hudson, O.
8. Forest Trees Most Suitable for Streets, Lawns and Groves,
J. Beaufort Hurlbert, Ottawa, Ont.
9. The Destruction of Forests and Tree Planting,
John Dougall, Editor of New York *Witness*.
10. The Introduction of Trees and Shrubs at the Ontario Experimental Farm,
Prof. Wm. Brown, Guelph, Ont.
11. A Few Thoughts on the necessity for a certain portion of each Farm being left in Forests....J. Beaufort Hurlbert, L.L.D., Ottawa, Ont.
12. Forest Economy of Canada.....Stewart Thayne, Ottawa, Ont.
13. Experimental Plantation of the Eucalyptus, near Rome,
Franklin B. Hough, Ph. D., Lowell, N.Y.
14. Conditions of Forest Growth.....Bernard E. Fernow, Slantington, Pa.
15. Lessons to be Learned from the Forests of Western Asia,
Prof. H. S. Osborne, Oxford, O.
16. Borers in Forest Trees.....Rev. Thomas W. Fyles, Cowansville, Quebec.
17. How Farmers May Grow Forest Trees from Seed,
D. W. Beadle, St. Catharines.
18. On the Growth of Black Walnut Timber in Ontario..Thomas Beall, Lindsay.
19. On the Growth of Poplar Trees for the Manufacture of Paper and Charcoal,
W. Saunders, London.
20. A Few Practical Remarks from the Lumberman's Standpoint,
J. K. Ward, Montreal.
21. Oaks of Hardin County, O.....W. F. English, Mount Victory, O.
22. Tree Planting for Railroads.....Dr. John A. Warder, North Bend, O.
23. Timber Trees of the Black Hills.....Robert Douglas, Waukegan, Ill.
24. Remarks on the Canadian Cultivation of the Catalpa Speciosa,
Robert Burnet, Pictou, N.S.
25. The Coniferous Trees of the United States and Canada..Dr. George Vasey, Botanist of Department of Agriculture, Washington, D.C.
26. Black Locust Growths.....Dr. John A. Warder, North Bend, O.
27. Experiments in Tree Planting on Cape Cod,
Joseph S. Fay, Woods Holl., Mass.
28. The Ash.....Arthur Bryant, Princeton, Ill.
29. Larchmere, a Plantation on Drifting Sands,
Dr. John A. Warder, North Bend, O.
30. Three Motion Plan of Planting.....Robert Douglas, Waukegan, Ill.
31. Extensive Planting by Shelter-belts..H. M. Thompson, Preston Lake, Dak.
32. Classification of Oaks.....Dr. John A. Warder, North Bend, O.
33. A Western Greeting.....James T. Allen, Omaha, Neb.
34. Forest Tree Plantation.....B. F. Peck.
35. Trees, Tree Planting, &c.....J. A. Mathewson, Little Metis.
36. Planting on the Plains, &c.....H. M. Pennel, Russell, Kan.
37. Timber Culture a National Necessity.....D. C. Schofield, Elgin, Ill.
38. Rural Improvement.....B. G. Northrup, Clinton, Conn.
39. The Commercial Value of Pruning.....John S. Hicks, Roslyn, N.Y.
40. Apology for the Pioneers.....John W. Caldwell, Cincinnati, O.
41. Living Fence Posts.....Wm. H. Ragan.
42. Roadside Tree Planting.....W. A. Hale, Sherbrooke, Que.
43. Letter upon Forestry.....D'Ailly, Malvern, Ark.
44. Fungi Injurious to Forest Trees.....Byron D. Halstead.
45. Forests in Connection with Water, as Aids to Climatic Amelioration,
T. T. Lyon, South Haven, Mich.
46. Forests of the United States, as shewn by the Census of 1880,
N. H. Egleston, Williamstown, Mass.
47. Forest Cultural Survey, &c.....General William Burns, U. S. Army.
48. Economic Tree Planting: How and Where.....B. Gott, Arkona, Ont.

49. The True and False in Arboriculture.....William Robb.
50. The Mills of West Fork.....J. Jenkins, Winona, O.
51. Individual Effort in Preserving and Propagating Trees,
Dr. Reginald A. D. King, Compton, Que.
52. Profitable Forest Culture.....C. E. Thorne, Springfield, O.
53. What to Plant for Forest Trees, for Groves and for Wind-Breaks,
Suel Foster, Muscatine, Iowa.
54. Canada's Forests, and her Future as a Steel Producer,
Edward Haycock, Ottawa, Ont.
55. Climatological Range and Geographical Distribution of Forests, and the Climates Favourable to Them ..J. Beaufort Hurlbert, LL.D., Ottawa, Ont.
56. Plan of Instruction in an American School of Forestry,
Prof. Adolph Leue, Cincinnati, O.
57. The Relation of Forests to Agriculture,
A. G. Humphrey, M.D., Galesburg, Ill.
58. Forestry from a Hygienic Standpoint....Henry Howard, M.D., Montreal.
59. Some Notes and Remarks on the Denudation of Our Forests,
G. L. Marler, Montreal.
60. How the Forest of the Eastern Townships was Broken Up—A Brief History.....Rev. T. W. Fyles, Montreal.
61. "Woodman Spare the Tree"—The Forestry of the Niagara Section,
J. R. Martin, Cayuga, Ont.

At the conclusion of the preliminary business the Congress proceeded with the reading and discussion of papers, which occupied the remainder of the afternoon.

In the evening a meeting was held in the Queen's Hall, which was well-filled with an appreciative audience, including a large number of ladies.

The platform was tastefully decorated with rare potted plants in full bloom, and upon the table were ranged bouquets of choice exotics. In a conspicuous position behind the President's chair was the legend "Woodman, Spare the Tree," and on either side of this inscription were shields bearing the words "American Forestry Congress, 1882," and surrounded by the American and English flags entwined together in a manner emblamatic of the friendly union existing between the two nations. While the audience were taking their seats music was discoursed by the City Band.

The Chairman, in opening the meeting, said the duty which had been imposed upon him was a most pleasant one. He was called upon to welcome and offer the freedom of the city to the gentlemen who had come to Montreal for the purpose of discussing questions of great importance, not only to the Dominion of Canada but to the whole continent of America. He would merely briefly introduce to the meeting those gentlemen who were now on a visit to the city, and he hoped they would receive a hearty welcome from all the citizens of Montreal.

The Hon. Mr. Joly was first called upon to address the meeting. He said that the task which had been allotted to him was a pleasant one; that task was to welcome their friends, for he called friends all those men who were united together in what he would attempt to show was a great cause, and a cause that deserved the sympathy of all. He was glad to be called upon to welcome those men; those who came from the United States, and those who came from Ontario, New Brunswick, and all the other Provinces. He might also say that the Government of the Province of Ontario took a deep interest in the subject of Forestry, and had deputed four men of experience on this subject to represent it at the meeting. He was particularly glad to see so many ladies present, which afforded ample evidence that the question was one of great interest, and not so prosaic as generally supposed, and he would endeavour to treat it in a manner worthy of his fair auditors. It was customary for the Chairman at such a meeting as this to explain in a few words the object of the meeting. This meeting was held, he might say, in the interests of Forestry. Now, what did Forestry mean? He knew that in the Province of Quebec, in the land of forests, so to speak, this question was not one which awakened a very powerful echo in the hearts of its inhabitants. Time was when we thought that we

had an inexhaustible supply of wood, and we pointed with pride to the rafts of timber which floated down our rivers, and to the vessels which took our lumber abroad. We thought that we supplied not only Great Britain with lumber, but also a large part of the Continent. Canada, however, did not send to England one-fourth of the lumber which she consumed, while what we sent to other parts of Europe was but as a drop in the bucket. Fifteen years ago a certain gentleman raised the warning voice against the ruthless destruction of the forests. He referred to Mr. James Little of Montreal. Mr. Little ought to be here now in the speaker's place. But Mr. Little was eighty years of age, and his physical strength did not allow him perhaps to stand the fatigue which he might have to undergo. But he was sure Mr. Little must be proud now to see the Province of Quebec and the whole world acknowledge that he was right when he was trying to stop the wholesale destruction of these forests. He (Mr. Little) was laughed at then, but he was vindicated to-day. Even two hundred years ago this warning had been given. He had seen in old manuscripts that the former French Governors in 1690 had recognized the danger which threatened our forests. Where were our forests now? Many old homesteads that have been handed down from father to son, generation after generation, have been sold, and why? Simply because there was not a stick of firewood upon them. But people asked now, where does all the lumber come from which we see passing down our rivers? It comes from the height of land which divides the water shed of the St. Lawrence and the water shed of the Hudson's Bay, 200 or 300 miles away. A few years ago there seemed to be an inexhaustible supply of timber between the Ottawa and the St. Maurice; but now people met together disputing with one another over the timber in the heart of that region. In Ontario the same state of affairs also existed. There was then, it would seem, some need for foreseeing, and for the education of the public in this regard, and the large audience which he saw before him spoke well for the interest that would in future be taken in this subject. About ten years ago Mr. Levesque Daillebout was instrumental in starting a Forestry Association in this Province, one of the laws incumbent on its members being that they were bound to plant a certain number of trees every year. But unfortunately that association did not live very long. There were those who said that it was all very well for the older countries to talk of planting timber, but in a country like Canada, where nature had planted forests with such a liberal hand, what was the use of talking about planting trees? But they must consider that there were countries newer than Canada where this question had been taken up—such as New Zealand, Algeria, etc.; they could even call Montreal old as compared with the United States. About sixty or seventy years ago, immense tracts of sterile, sand plains near Bordeaux, France, were planted with trees, and turned into forests, and as a consequence, to-day the people of that place manufactured everything that timber can produce. They had, not fertile fields, but fertile forests, which would even yield a more increasing revenue. What could we do in this country, and what ought we do? There were two ways of working in this matter—one was by protecting the forests we have now, and another was by creating new forests, and they would not expect that any one man would consider these two questions from the same point of view, some being in favour of protecting our present forests, while others were in favour of planting new forests. But both the preservation of our timber and the creation of new forests in regions where they do not exist were absolutely necessary. The greatest enemy, however, which they had to fight was forest fires, and they had to consider what they could do to fight those fires, and to prevent the total destruction of timber limits. He might perhaps mention his own experience in cultivating trees. He had under his control about 100,000 acres of land, on which he turned out from 35,000 to 40,000 spruce logs every year, and by following one rule—that is, not to allow a tree to be cut under twelve inches—and by observing this rule he could have an everlasting supply of spruce. He desired every farmer to know that with courage, perseverance and a little intelligence, he could have an ample supply of timber, not only for firewood, but for building purposes, so that not only himself but his children after him would have a steady and continual supply. He spoke at some length on the subject of the Black Walnut tree, which grew, he said, three times as fast as Pine and five times as fast as Spruce, and was easy to cultivate, except that it required very rich soil. He had had eight years' experience in the cultivation of the Black Wal-

nut. His experience had taught him that it required deep rich soil. If any of his audience had farms on which there was damp soil, they could grow such trees as the Tamarac, if they had light sandy soil, they could grow Pine, Spruce, etc.; but if they had good, rich, deep soil, they would waste neither their time nor their land in cultivating Black Walnut. He was authorized by a statement of Prof. Hough, Chief of Forestry at Washington, to say that in fifty years one superficial acre would support 680 trees under the most favourable circumstances. He would, however, only take 400 Black Walnut trees to the acre. Now the average growth of Black Walnut in Canada, according to his own experience, was half an inch a year, although on the shore of Lake Simcoe, where the soil was exceedingly rich, they increased nearly an inch in size per year. But suppose their average increase was half an inch, consequently in forty years, twenty-inch trees would be secured. Black Walnut at present was worth $1 per cubic foot, so that calculating each tree at twenty-five cubic feet they would have $10,000 as the result of forty years growth upon one acre of land. According to Prof. Macoun's report, our Western Prairies were once covered with a thick growth of timber; why should not these prairies be covered again, at least partially with forests? Some people were of the opinion that our governments should take hold of this matter, as men's lives were too short, but he could assure them that if men's lives were short, government's lives were still shorter. But a man should do his duty, and not be calling upon the Government to do his work. In some of the States very liberal premiums were given to encourage the planting of trees, and he thought the Government of Quebec might well take similar action. At the last Session of the Legislature he introduced a measure looking to the establishment of an "Arbor Day," like that existing in the United States. In this respect we might well follow the example of our practical neighbours. Even in the State of Michigan the Governor issued a proclamation establishing an "Arbor Day," although that State produced more lumber than the whole Dominion. The subject of forestry was a hobby with him (Mr. Joly), and he could assure his audience that it was one which no one could take up without becoming enthusiastic over it. If it was an evidence of faith in Divine Providence for the farmer to sow his seed in the spring time, in the confidence of reaping the harvest in the course of a few months, how much greater evidence of faith was it to plant young trees for which half a century or a century were required to bring them to maturity?

Prof. F. B. Hough, chief of the Forestry Division of the Department of Agriculture, Washington, then delivered an address. He said:—

Mr. Chairman, Ladies and Gentlemen:

In considering this subject of Forestry from various points of view, we find it a very complex one, involving many principles in science, and coming directly home to matters of practical business and the affairs of daily life. It is therefore a subject that should receive attention both from the man of science and the man of business, the one to study the principles of knowledge that are involved, and the other to apply them to use.

When we eonsider that our native supplies of timber were largely beyond our wants, and that a part must be removed before agriculture could be introduced, it is not, perhaps, surprising that the habit of destruction should have continued beyond the limit where it should cease. It has become apparent to thoughtful men that this point has been reached and passed and that unless measures are seasonably adopted for the maintenance and renewal of our forest products we must, in the near future, feel the great inconvenience that will result from their want.

It was for the direct purpose of awakening a public interest in this question and for devising the means whereby these dangers may be averted that the American Forestry Congress has been organized, and in pursuance of this intention I invite your thoughts to some points that will, I trust, be deemed worthy of notice, as tending to secure this object.

In the case of forest products, their weight and bulk at first limited their transportation to the floating upon streams, and the extent of demand and the price were measured by the distance they were to be carried to the place where they were to be used.

A forest covered with timber trees, alike in dimensions and quality, was far from being uniform in value, so long as there was no other mode of bringing it to market than that of drawing it by teams to a bank, where it could be floated upon streams. The parts nearest to floatable streams were first taken, and then successively the rest, until, perhaps, the more remote remained without sale, for no other reason than the cost of moving, which would equal or exceed its market price.

But in recent years, since the introduction of railways, the facility for their construction, and a marked increase in the demand and in the prices of lumber, have led to their construction into timbered localities that could not formerly be reached, and often with the intention of removing their tracks when this supply was spent. In a level region like that in Michigan and in parts of the Southern States, where there were no serious difficulties in the way of construction, these railroads have rapidly exhausted the supplies along their route, and are every year narrowing down and annihilating the woodlands through which they pass, until we can now in many places almost see the end of supplies which but a few years ago were looked upon as sufficient for indefinite use.

By means of railways the lumber from these regions, either in its rough form or manufactured for use, is now cheaply carried to distant points in the interior, and used in regions where houses and fences could scarcely have been built had the materials been brought by the old ways of land carriage. As the supplies of a once timbered region begin to fail, the deficiency is made up from more distant points and equalized according to the demand without much regard to space, and so long as there are regions within reach of railways where materials can be found for supplying the trade, we shall not realize the extent of the exhaustion until we nearly approach the end. If our railroads equalize the supply, they are at the same time equalizing the ruin which will be felt with equal weight in regions once supplied from their local woodlands, and in the prairie regions that had none.

In the older countries of continental Europe, necessity has long since taught prudence in the care of their forests, and conservative measures have been devised and matured, that deserve our careful study, although from the wide differences that exist in the organization of their governments, and in the tenure of property, we cannot apply their systems of administration, however much we may profit from their methods of cultivation and management.

Throughout the United States, and to a large extent in Canada, especially in the Upper Province, the lands have been conveyed to private owners as their absolute property, and without any conditions or reservations whatever as to its cultivation or use. Its owners may clear or plant trees, or any other crop, as they find it for their interest, and with a prevailing public sentiment favouring the undisturbed enjoyment of property by its owners there is not the slightest prospect that a law would ever be passed, or that it could be enforced, for the compulsory reservation or planting of woodlands upon private estates. The owners must see it to their interest and profit to cultivate trees before any plantations are made beyond such as may be undertaken for ornament or for a definite use. If they feel the want of wood for fuel or fencing, or other uses, and find that it can be grown cheaper than it can be purchased, they will plant. In fact, the principle that here applies is the same as in cultivating grain or fruits, with this marked difference, that the planter must wait a longer time for his returns, and of course must have other means of support while his crop is growing. His estate, however, is all the time gaining in value, so that if obliged to sell it he can at any time realize the returns from his investment in value if not in kind.

It would be well if he would forsee this need, and thus escape the realization of the want which improvidence will be sure to bring. It must be the work of education everywhere, if we would awaken the public to a proper understanding of the importance of this subject, and of the duties that each one owes to himself and to the future, in regard to this great question of Forestry which we have assembled to discuss on this occasion.

It is the part of true wisdom to look upon this beautiful earth, as held by us in trust—it is, at best, only a life-lease that a man holds to the estate for which he holds an absolute deed of possession—and it is our solemn duty to so manage this trust as not to dissipate its value, or perhaps render it wholly incapable of restoration.

It is, perhaps, not fully realized how easily we may do an injury to a country which the most costly and painstaking labours can scarcely overcome. In passing up the valley as the railway from the city of Turin leads up to the Mount Cenis Tunnel, the country, at first a perfect garden of fertility, is seen to be encumbered with the *debris* which have been brought down the stream from the mountain sides, in many places covering the alluvial soil with a worthless deposit of gravel and sand. In some places the owners, by gathering this material into great piles that cover half the surface, have managed to plant the remainder; but it is almost a forlorn hope, and at best but a costly and imperfect attempt to recover a part of what would otherwise be wholly lost.

In this instance the injury has been largely caused by the throwing of loose materials into the stream from the roadway along the bank, and from the numerous small tunnels through which the railway passes; but it is also partly due, and in a multitude of cases elsewhere it is wholly due, to the clearing off of the woodlands upon these mountain slopes, and the inconsiderate pasturage of the herbage by which the surface has been exposed to dangerous erosions, and slides of the loose materials into the channel of the stream.

We have here a common and familiar instance of the irreparable injury that is being done everywhere in the clearing off of forests upon steep declivities, and of the damages which one person may do to the property of another without actually entering upon his premises or exposing himself to a charge of trespass within the common meaning of the law.

Without further considering the duty of the private citizen beyond that of planting and protecting trees upon his own land wherever the opportunity offers, let us turn to consider what our Government should do to protect the interests of their citizens in the matter of forest planting and conservation. But before doing this we might stop for a moment to notice what they have neglected to do for the protection of this great interest.

In the beginning, we find in the States, while still British colonies, an occasional indication of a policy which does credit to the men of that day, in reference to the maintenance of forest supplies, and it would have been well had the thought left something more than its record.

In laying down a system of regulations for the guidance of his settlers, William Penn prescribed that a fifth part of the whole area of his province should be reserved in woodlands—a percentage very nearly the same as that demanded by the best approved authorities of the present day. Had this precept been observed, Pennsylvania would ere this have been checked in the destruction of some of the finest and fairest forests in regions where the fruits of early years can no longer be cultivated by reason of bleak exposures and late spring frosts that were unknown when woodlands were more common than now.

In Plymouth Colony, half a century earlier, and eleven years after the first landing of the pilgrims, we find stringent regulations against the setting of forest fires, under penalty of damages for the injury that might be done, and "if any person fire ye woods yt hath noe just cavse so to do, hee shall forfeite to ye countries vse or be whipt."

But perhaps the most interesting traces of the conservative policy of the early period of colonization may be found in the measures proposed in the then French colony of Canada. During the reign of Louis XIV. the grants of land that were being made in Canada were coupled with the condition that pine timber fit for masts of vessels should be reserved from clearing in certain cases, the property therein being retained by the Crown.

It would be an interesting study for a Canadian archæologist to trace up the history of these reservations, with a view of ascertaining how extensively they were made, and how far they were observed.

But in the United States the general government has almost altogether lost its opportunity in the disposal of its national domain. It would have been possible to insert a clause in the patent for every section that it conveyed that a certain portion, if already timbered, should be preserved in woodland, or if a prairie, that a part should be planted within a time and in a manner that would not have been burdensome, and that these conditions should follow the title in all future transfers.

But without dwelling further upon what might have been done that was not, or further noticing the good intentions that failed, let us consider what may still be done under authority of government in providing for the public welfare with respect to forest supplies.

The plan I would suggest as worthy of study for this object would be somewhat as follows :—

Let a system of forest administration be established that should include the means for exploring and estimating the extent and value of timber tracts. Let them be divided and described by natural boundaries into parcels of convenient size, ground rent be fixed that should be reasonable in amount and certain in its terms of payment. Let these parcels be leased one year at a time, but with privileges of renewal at the end of each year upon strict compliance with all the terms of the lease. Let the principal revenue depend upon the amount of timber brought out, and in case of competition for the privilege, let the man have it who will bid the most. Let the terms of the lease reserve the young trees below a given size, and impose strict attention to prevent forest fires. And finally, let the land be reserved and protected for a future growth. Inspections and reports should be required to ensure a knowledge of the fidelity of all parties to the conditions of the law and exactness in the returns, and the business of each year should be embodied in an annual report.

A plan of forest management, having for its object sustained production for indefinite time, implies a special qualification for the service, and both a theoretical and practical acquaintance with all matters affecting the growth and reproduction of woodlands. It needs maps, plans and a programme for future management; the location and construction of roads for the removal of products; the measurement of standing timbers; the calculations of areas and contents, and a wide range of knowledge in the sciences that concern the welfare of forest growth; the prevention of injuries so far as within the skill of man is possible, and a habit of study and observation that qualifies the mind for appreciating and applying any modifications of a plan as new conditions may require, and as unforseen contingencies may arise.

In Europe, where forestry has been practically studied for centuries, Schools of Forestry have been established under the care and at the expense of governments or of associated proprietors of forest estates, for the express purpose of preparing candidates for the forest service, for the intelligent and successful discharge of their duties, and none but those who can bear the test of rigid examinations and of approved practical skill are entrusted with the care of the public forests.

With us there has been hitherto no inducement for young men to qualify themselves for such a position as the superintendent of a forest would be required to fill, and no opportunity would have been open for them had they the requisite qualifications for the trust.

There can be but little doubt, however, but that persons fully qualified for a beginning, could be easily found, and that others would seek to qualify themselves whenever there was a prospect of permanent employment.

But there is another class of duties that relate to the sale of timber and its delivery —to its protection from trespass, and other administrative details that can be performed by any person possessing vigilance, energy, integrity and a good business talent.

It might be proper to assign these general duties to two classes of agents under one central direction, but acting separately, each in matters relating to his own charge, but both in harmony with the general plan. In case of such a division of duties, the one looking after the general welfare of the forest should decide when and where and how a cutting should be made, reference being therein had to the condition of the woodlands, and the welfare of their future. It should have the care of inspection, to insure faithful observance of its rules and conditions in the work done, but he should have no interest nor motive in any way relating to the sales, and in European Forest Codes, not only are the agents in the service excluded from dealing in forest products, but their relatives also, within the limits of probable interest, or the sympathy of family ties.

Already in the British Colonies of Australia, in New Zealand and in India, systems of Forest Management have been commenced in a way that promises good success—but from the necessities of the case, each country has much to learn that could not be applied in another.

Let us next for a moment consider the duties and opportunities of Canada in this great question of National Economy, which, whether we are willing or not, will unavoidably and only too soon be pressed upon our notice. The crown lands here belong to the Provincial Governments, excepting in Manitoba and the North Western Territories, in which they are owned by the Dominion Government.

This plan of management differs somewhat in its details, but in the main is this:—The forest is leased, generally at a certain ground rent per square mile, and for short periods, and a certain rate of tax is collected upon the timber that is taken out. If two lumbermen want the same tract it is put up at auction, and the man who pays the most for the privilege, in addition to the ground rent and the rate tax, obtains it; but generally the man who has made improvements, and has complied with the terms of his lease, is allowed to renew it from year to year until the timber is all removed. The soil itself is retained by the Government, and after a lapse of time it may again come into market for the sale of another crop.

We may congratulate the Canadians in having already, and, perhaps, inadvertently made a long advance in the way of forest management, which, with amendment, may gradually be brought into a very complete system. In the Province of Quebec the pine trees under twelve inches in diameter are reserved from cutting. It would be better to rescue them of larger size, because a pine of that size is gaining more rapidly than at any other period, and it is a sacrifice of interest to cut it of that size.

This is good as far as it goes; let me suggest some further regulations tending to profitable returns and to future supplies. Let the wood-lands where the timber has been cut be carefully protected against fires, against pasturage, and against plunder. It would require a system of forest wardens, or guards, and would require some outlay, but the investment would, in the end, prove profitable in the result.

Let there be introduced at first, in your agricultural schools and your colleges, instruction in Sylviculture; and at the first, and till something better could be provided, let each graduating class have the opportunity of hearing at least a few lectures upon the first principles of forest management and of tree planting—and the profits that result from judicious planting upon private estates.

With a proper study of the methods by which the public timber lands should be managed, I am convinced that a judicious and practical system could be devised for bringing these lands up to the standard of greatest possible production, and that it could be sustained for a long period of time.

But aside from this management of public woodlands by the Government, there are other, and vastly greater objects to be attained, in the way of planting, by the owners of land. We have already noticed the fact that throughout all the older States of the American Union, and in most of the settled portions of the newer States and the Territories, as well as in the settled portions of Canada, the title to the lands has been passed to private owners, without reservation as to their cultivation or their clearing, and that neither a general nor a local government can interfere in their management, so long as they do no injury to the public.

It is these owners of lands that must do all the planting ever done upon them—at least from our present stand-point we can foresee no prospect that any such improvement would be undertaken at the public cost, or by compulsion of law.

But men do not incur expenses unless they can expect returns, either in advanced values, or in saleable products, and they must be made to realize that money is to be gained or saved, before they will be willing to incur expense.

It is the main business of Forestry to teach how this can best be done in tree planting, in places best suited for their growth, it implies a knowledge of the climatic conditions, of the capabilities of the soil, the requirements of particular species, and the best methods of management.

In undertaking this cultivation, it is of the first importance that we should understand, not only the limits of possible endurance, but especially those within which we may secure the most favorable growth. In a region that was covered with timber when its settlement began, we have generally an evidence of what might be secured by plant-

ing, in the remnants of the native growth still remaining, or in the plantations that may have been formed for ornamental purposes or other use.

Dr. Hough concluded his address by recommending experimental cultivations with the view to ascertaining what varieties of forest trees are best adapted to different sections, especially in the prairie regions.

Mr. D. W. Beadle, of St. Catharines, one of your delegation, was next called upon to speak, but owing to the late hour, it being then after ten o'clock, contented himself with moving the adjournment of the meeting, saying that he would improve some other opportunity of addressing the citizens on the subject of Forestry.

Tuesday, August 22nd.

There was a large attendance at this, the second day's proceedings of the Forestry Congress. Among the distinguished representatives of Forestry from theUnited States were the Hon. George B. Loring, United States Commissioner of Agriculture, and President of the Congress ; Dr. John, a Warder of North Bend, Ohio ; Dr. Chas. A. Mohr, of Mobile, Alabama ; Prof. Franklin B. Hough, Chief of the Bureau of Forestry in the Department of Agriculture, Washington ; B. E. Fernow, of Slatington, Pa.; J. W. Manning, of Reading, Mass.; J. H. Hicks, of Roslyn, N. Y.; Byron D. Halsted, of New York City, and General Eaton, Commissioner of Education for the United States.

The Hon. George B. Loring, President of the Congress, took the chair and addressed the meeting as follows :

He had come here with considerable difficulty, and in the midst of a great deal of hard work of a certain kind, not because he was officially connected with the Congress, but because of the high estimation in which he held the object for which they were met together—the object of preserving, protecting and restoring the forests of this country (by this country he meant Canada and the United States, and as far south of the States as any ambitious gentleman was desirous of going), and of indicating to the world as far as they could what was the value of the great forest growth of this Province. Another reason for his coming here was that he was glad to know that there was one pursuit in which Canada and the United States had a common interest, and on which they can in no way be divided. It was a good thing to join all our nationalities in one common interest, at any rate. For a long time the question of Forestry had been so to speak æsthetic, but it had been followed up so persistently that trees had reached the position which they had a right to claim. Every man knew how to adorn his farm ; in fact our ancestors, 200 years ago, built up what might almost be termed forests round their farms, which were standing to-day as an example of American industry, American taste and American determination to make the American home what it should be for the intelligent man, woman or child. What he meant by America was not only the United States, but the whole North American Continent, with a total disregard for political differences, and a total disregard for social, civil and religious differences. He had begun on his own farm 25 years ago and planted evergreens and other trees, adorning a bleak hill, in order that he might have a nice home, and he grew just as familiar with the peculiarties of these trees as he was with his Ayrshires, his Black Hawks or his Merino sheep. He had been particularly unfortunate with his Black Hawks, not one out of 500 was a trotter, and he could not keep sheep in a State where boys would shoot everything else except another boy, and that accidentally. After an absence from that farm for three years, he still remembered the evergreens, the spruce, the hemlock and the white pine—the noblest tree grown on this great North American Continent—and other trees that were upon it. The student of Forestry is really a botanist, because he feels the same interest in a tree that a botanist feels in a rare plant. We have been shown, not only the habits of trees, but their origin and their peculiarities, and also the climate and soil to which each is adapted. We owe our knowledge in this direction to such scientific investigators as Michaud, George B. Emerson, and others. The scientific part of this matter had been thoroughly discussed, and there was not a man in the room interested in Forestry who did not know where to go to get the peculiarities of any tree which he desires to cultivate.

We are greatly indebted, therefore, to the scientists who have spent so much time in investigating this subject. All thanks to the Scientists who told us where the pine tree and the walnut tree would best grow, where we could most profitably plant the maple, the birch and the willow, and where the eucalyptus and the catalpa would best grow and do the most good. To these men, therefore, who have laid the foundation of this great work that we are just entering upon, all honor and praise are due. He expressed astonishment at the timber wealth of Canada. He said they had done well in having a paper read to them by a practical lumberman, giving a practical view of the great timber wealth of this country, and also some practical hints as to how this great wealth could be preserved. There were great wheat fields in the North-West; he had visited the great cotton plantations of the South, and the great cattle ranches of the West. But alongside of wheat and cotton and cattle there stood in the forests of this country a greater mine of wealth than the wealth of cotton, wheat and cattle combined. Why had this great mine of wealth been forgotten? The great trouble had been hitherto that every man had felt that he had a perfect right to go on to Government lands and cut his own wood and do as he pleased with the lumber thereon. The law of possession had not been as strictly applied to them as it had to agricultural lands. This was a great mistake; we must bring the public forest lands under the supervision of law as closely as are the farms of individuals. The invasion of timber lands or forests was just as much an invasion as was the trespass upon private property. The value of the lumber industry in Canada had been referred to, but he would tell them, as he told an audience at a meeting in Massachusetts some time ago that the products of the lumber industry alone in the United States annually amounted to $250,000,000. It had grown to enormous proportions. There were other industries which had grown wonderfully too. The product of the leather trade in the United States to-day amounts to $150,000,000 annually, and when he told the merchants and manufacturers of Massachusetts that that industry had grown up within his time they were perfectly astonished. But he could remember when it took a peripatetic cobbler one week to make him a pair of boots and it took him three years to grow out of them. Now a man could, with the machinery of Lynn manufacture 1,200 pairs of shoes a day. The silk industry had also increased within the last ten years from an annual product of $10,000,000 up to more than $35,000,000, and the American silk to-day found a ready sale, although many ladies thought that the sheen of the French silk was a little better than the American. The United States learned to take care of her silk industry just as England did after the Anglo-French treaty had expired. The lumber industry in the United States amounted to $233,000,000 annually, and the number of persons employed in it was about 141,000 besides about 500 children and 2,000 or 3,000 women, enough to make a very respectable sized city. The amount of money paid in wages to these persons for the support of their families and the education of their children was nearly $36,000,000 a year. Was he wrong then, in claiming that the foundation of this industry should be as sacredly protected by law as the cotton, the boot and shoe, or any other industry? The question had passed out of the sphere of individual tree planting for ornamentation, had passed out of the sphere of scientific investigation, and they were engaged to-day in developing, preserving and protecting our forests, among other things, in the interest of our lumber industry, one of the three great fundamental industries of this world. This industry was certainly entitled to some consideration, and the question naturally arises what consideration was it to receive? In the United States, as they all know, there was a great variety of Governments, why they had more than 15,000 law makers in the United States, and they managed to get out of them a pretty good lot of laws. They had their Congress and Legislatures and Municipal organizations, all engaged in making laws, statutes and ordinances, and they could find, if they were to number them, that there were nearly 15,000 of them engaged profitably at it.

He said it was pretty hard to tell what was to be done. The Federal Government had no right to go into any of the States, but it had special privileges, and could set the different States a good example, at any rate. One thing they wished to know, was how to protect the forests from the settlers themselves, who look upon a pine tree three or four feet thick with profound contempt, but who regarded a stalk of wheat a sixteenth

of an inch thick with the most profound respect. He did not know what they did in Canada, but he thought none of those lands which are unfit for the cultivation of anything else except trees should be occupied, and the Government should protect them just as well as they protect the most valuable agricultural lands. Let the Government declare, that all forest lands unfit for cultivation shall remain the property of the Government, who shall derive only such a revenue from them as shall not exhaust them. Then with regard to forest fires. He had studied the matter with great care, and the first thing we should do is to create a right of forest lands, and then infuse such an inpouring of opinion, that the settler will understand the value of forests, and understand that bush heaps or dead grass should be properly cleared up before setting fire to. It was only the other day that a man in one of the Eastern States with a farm valued at $60,000 or $70,000, and with a house upon it fully equal to an English manor-house, had it nearly destroyed by fire. Two little boys started the fire in fun and swam across the stream to get out of the way, and if it had not been for the courage and energy displayed by that man's wife, his place would have been completely destroyed. Yet, this was what settlers were doing every day, but, let him understand that a piece of land that is burnt over is more than half killed, and he will be more careful and preserve it. Nature was always restoring forests, and would do her share of the work if we would give her an opportunity. He had seen abandoned farms in the Eastern States which were growing up fine trees, and these would render them more valuable than they were before. From the official reports of the department at Washington, he took the following statement, showing the number of feet of pine at present in the undermentioned States, and the number of years it would last, at the rate they were now cutting it :—

STATE.	Number of feet of pine.	No. of years.
Texas	21,508,000,000	300
Florida	6,615,000,000	30
Alabama	18,885,000,000	70
Mississippi	17,200,000,000	150
Minnesota	6,100,000,000	10
Michigan	29,000,000,000	7
Wisconsin	41,000,000,000	20
North Carolina	5,229,000,000	50
Louisiana	48,213,000,000	540
Georgia	16,778,000,000	75
Pennsylvania pine	1,800,000,000	5
" hemlock	4,500,000,000	15
Arkansas	41,325,000,000	320
California	25,825,000,000	100
South Carolina	3,316,000,000	27
Maine, pine and spruce	5,000,000,000	16

New Hampshire does not return a pine tree of any kind, but returned 1,500,000,000 feet of black spruce, which will all be gone in ten years at the present rate of cutting.

This shows what we can rely upon in this section of the country, and, hence it was evident, that in about one generation the supply of timber in the United States would be almost completely exhausted unless means were taken to protect it, and prevent the present frightful waste.

At the close of President Loring's address, Mr. B. E. Fernow, of Slatington, Pennsylvania, asked whether the special Committee appointed at the Meeting in Cincinnati to consider the subject of

FOREST FIRES

was prepared to report.

DR. CHARLES MOHR said, that, in absence of the Chairman of the Committee, he had himself prepared a report on forest fires, and the injuries caused to the forests by inroads of cattle, which he would read.

The following is an abstract of his report so far as the points considered bear upon the conditions affecting the forests of Canada :—

I find myself not prepared to present a formal report, the result of joint deliberations, but venture to lay before the meeting simply a statement of the facts arrived at by the limited inquiries and observations made in regard to it in the great lumbering districts of the pine regions. Of these, like other forests regions, it can be said, that the fires raging season after season through their forest have caused a greater and more irreparable destruction, inflicting a deeper harm than all the devastation brought about by the combined lumber industries of the past and the present day. The practice of setting fire to the woods existed among the Indians before the arrival of the whites. The white settler to meet the necessities of his existence, had to spend the energies of his life in the destruction of its forest growth, engendering a habit of destruction and a disregard for the forest, which, under vastly altered circumstances still comes into active play, leading to a needless devastation and neglect of the preservation of the forest, detrimental to private interests as well as to the public wefare. Many of the forest fires are the consequence of carelessness, neglect, and utter indifference to their consequences, as frequently they are wilfully started to serve some purpose.

The first effect of these fires is the total destruction of the pine seedlings, which, together with the younger growth, are not strong enough to resist the effect of the scorching to which they were exposed.

Another effect leading pecuniarly to enormous losses, is the arrest of the growth in the trees exposed to these conflagrations. This is most remarkable, and no doubt due to the injurious effects of the heat.

Another most pernicious effect resulting from the recurring fires is the total destruction of every particle of organic matter in the surface soil, reducing it to a state of arid, barren sand of absolute sterility. All efforts of single individuals are of no avail in abating this crying evil, they must be persisted in by the community, and it is only by judicious legislation that its correction can be reached.

INJURIES BY CATTLE.

The injuries resulting to the forest from the inroads of live stock are, direct and indirect, scarcely less detrimental to its preservation than those sustained by fire. The unrestricted pasturing of cattle leads more slowly, but not less surely, to its final destruction. The direct injuries result from the browsing and eating of the tender plants in their youngest state, and of the young shoots ; the tearing, breaking, and tramping down of the small growth, leading to its mutilation and premature decay, or to their being killed outright ; in short, to the impossibility of the rejuvenation of the forest by its natural seeding. In the pine lands these injuries are less apparent, and less fatal to the progeny of the pine, the young trees being not eaten by stock, and the chief injuries to them result from tramping. The running at large of live stock is indirectly injurious to the forests by reason of the enormous draft upon its resources of timber to build fences for the protection of the crops from the cattle. The enormous sacrifices of timber and labour required in the fencing of tilled lands are a great drawback to the tiller of the soil, which

makes itself in the older settled and more densely populated districts severely felt, and the necessity of the abolition of the old ways has led in several of the States to the adoption of a stocklaw, general or optional with the various sections of the State. In South Carolina the stocklaw was first optional with the counties, and after a short while its benefits became so apparent that it was applied to the whole State. The violent opposition with which it was met by the poorer population of the low country has gradually disappeared, the people becoming reconciled by its benefits, and its introduction is to be regarded as a great impetus to the prosperity of the farming community.

The reading of this report was followed by a very interesting discussion on the subject of forest fires. Mr. PETER WHITE, M.P., of Pembroke, said he had given the question close attention for over ten years, especially as affecting the Upper Ottawa region, where he had no hesitation in saying quite as much timber was swept away by fire as fell beneath the blows of the lumberman's axe. What the latter cleared might be put at between twenty and thirty millions, while that destroyed by fire at certainly not less. His own conviction was that the greater part of the waste was attributable to the carelessness of the sportsman and fisherman, and a very small portion of it only to those engaged in lumbering. New settlers were also responsible for a good deal of the mischief. He did not doubt that the employees of lumbering firms were not always free from blame, but it was absolutely to the interest of their employers to take every possible precaution to save the wood in their limits. What could be done better to prevent this loss of valuable property from this cause? He understood that while in Quebec the burning of refuse on timber limits in July and August was prohibited, in Ontario the time of restriction was between April and November. Experience showed that the forest fires along the Upper Ottawa occur between May and August, those months inclusive, and his suggestion was to prohibit the starting of fires for clearing or other purposes within those four months. He would also suggest the division of the timber lands into districts, each under the guardianship of a policeman resident within it; one duty of such functionary being to visit every settler towards the close of winter, say some time in March, to give him all necessary information and caution as to the requirements of the law in regard to this matter. He believed there was very little incendiarism in the lumbering regions, and that the bulk of the fires that occurred originated in ignorance and carelessness. Officials, such as he had suggested, ought to keep a careful watch at all the principal avenues of districts liable to be laid waste by fire. He thought that the estimate offered of the loss by this cause, as compared with the product the lumbermen secured, was far too moderate; he believed it would be nearer the mark to say it was ten to one, than to represent the two as approximately equal. As to precaution it might be urged that as the lumbermen had so large an interest at stake, they might be looked to to provide the necessary precautions. That was true in a sense, and he had no doubt that those concerned would willingly submit to the imposition of a small tax, if necessary, for the purpose of securing the required protection. The firm with which he himself was associated had for years looked after their own interests in this matter, but it was obvious to every one that it was out of the power of private individuals or business firms to act with the authority and force which the Government could command.

Mr. WRIGHT, Mass., related his experience of the ravages of fire in the vicinity of Duluth. His recommendation was that the *debris* which attended lumbering should be cleared away, or at any rate not let lay scattered but piled up in considerable heaps. He did not believe that lumbermen set fire to the forests; they knew better than to do that, but there was a certain amount of carelessness which worked a good deal of harm.

The HON. GEORGE BRYSON, Coulonge, said: "For the last few years the majority of fires in his district had occurred in May and June, and in September and October, and much good might attend the adoption of the suggestion to appoint officials for patrol duty through lumbering districts during these months." He agreed with what had been said as to the estimate of value taken out and value destroyed being glaringly inaccurate. Years ago he had stated before a committee of the House that the proportion of the latter to the former was fully ten to one.

Mr. JOHN DOUGALL, of New York, said the month of May was the first month in the year for forest fires, owing to the fact that at that time the ground was covered with

dead leaves and grass as dry as tinder, which took fire from a spark. Hence the month should be included in the time during which settlers should be forbidden to burn bush.

Mr. THISTLE, Ottawa, speaking as a lumberman of fifteen years standing, and also as a land surveyor, referred to the difficulty of disposing of the *debris*, owing to the circumstances under which lumbering operations are carried on in this country—the extent of the limits, the widely scattered shanties, &c. He was favorable to the idea of inducing Governments to co-operate with the lumbermen by the appointment of police for this special duty, who would act conjointly with their own men. The speaker went on to give a graphic description of the burnt lands of the Upper Ottawa and to the north of that region, and concluded by remarking that there was no doubt in his own mind that ten times as much lumber was burned as was cut.

Mr. WRIGHT suggested that it might be well to consider whether it would be possible and profitable to convert the lumber refuse into potash or charcoal or convert it to use in some other way.

Mr. J. R. MARTIN, Cayuga, said it was an undoubted fact that many forest fires were started by shantymen to make work for themselves when things were getting slack. The idea of appointing policemen to patrol the forest lands was a good one; every constable so acting would be at once a conservator of the trees and of the peace. He had heard of gangs being systematically formed in Wisconsin and Michigan for the pnrpose of firing the woods. He regarded favorably the suggestion, if practicable, of converting the lumbering *debris* to use.

Mr. WARD confirmed what has been said as to the wanton destruction of valuable forest trees—the yellow birch for instance which was sometimes set on fire for the very pleasure of seeing its instantaneous and brilliant blaze. There should be a heavy punishment inflicted in the case of every conviction of such atrocious conduct.

The Chairman, in a few words, expressed his satisfaction at the practical tone of the discussion, and his opinion that there should be provision made for the severe punishment of men who would destroy a forest but not think of burning a barn.

HON. Mr. JOLY moved—That it is the duty of this Congress to draw the attention of Governments to the necessity of better precautions against forest fires. He thought respectful representations on the subject would receive due attention from the Governments of the United States and Canada.

Mr. Joly's motion was carried, and, on motion, it was resolved that the Committee should consist of Mr. P. White, M.P., Mr. J. K. Ward, Dr. Mohr, Hon. Mr. Bryson, Dr. Hough, Mr. B. C. Fernow, Hon. Mr. Joly, Mr. William Little, Mr. Charles H. Sargent and Mr. E. D. Baker.

The remainder of the day was taken up with the reading of papers, many of them of very great value, to which fuller reference will be made in a subsequent part of our report.

The evening session was of a more popular character. It was held in the Queen's Hall, and was well attended by a large gathering of ladies and gentlemen. The Hon. Mr. Joly introduced the Hon. Gen. Eaton, Commissioner of Education for the United States, who had kindly consented to address the meeting.

Hon. Gen. Eaton said that, having had opportunity to observe most of the forests in the United States, he was able to appreciate the importance of this meeting. But he was here in his capacity of education. Forestry was a subject on which the general public must first be informed before they can take the remedial measures called for by the needs of our forests. Man should not be the enemy of the tree when God had placed them side by side to react upon each other for man's better health and greater happiness. The tree was man's friend, and he should be so taught to consider it. We must have text-books for the schools and scientific magazines, to set forth the importance of forestry. Since Dr. Hough had been appointed a commissioner to investigate the whole subject on this continent and in Europe, a great advance had been made in the education of the public mind. What was specially needed now was a scientific journal such as was projected by Dr. Hough. A text-book had already been prepared, and it was desired to introduce the subject into the two hundred normal schools of the United States, that thence the knowledge might descend to the children that God made the tree, and that it was their friend.

The Hon. Geo. B. Loring having come in, took the chair, and addressed the meeting at some length, in general terms, upon the importance of forestry to the American and Canadian peoples and its bearing upon the interests of agriculture, the great industry of both countries.

Mr. Joly said Canadians ought to be grateful to our American friends for holding their Congress in this city. He must confess that the address of the Hon. Mr. Loring had completely dispelled any false notions he had hitherto entertained concerning our American neighbours. We were accustomed to look upon them as a people devoted to the pursuit of the almighty dollar, but we had just had abundant evidence that in no country was the worship and love of nature, of country and of home more general and more intense than among our American friends. We could grasp them by the hand and rejoice to labour with them in the promotion of the interests of forestry and kindred objects. Although not a citizen of Montreal, the people of this city had deputed him to speak in their name, and in this capacity he now bid our American friends God speed, and thanking them again for their visit, hoped to see them often hereafter on the same noble, patriotic and humanitarian errand.

The meeting then dispersed.

August 23d.

The Forestry Congress met at their rooms on St. James' Street at half-past nine o'clock, the Hon. Mr. Joly in the chair.

Preventing Forest Fires.

The Hon. Mr. Bryson presented the report of the Committee appointed to memorialize the Government with reference to preventing forest fires. The report recommended, first, the reservation of all pine and spruce lands, unfit for settlement, for lumbering purposes exclusively; second, prohibition of the burning of brush by settlers in the vicinity of fir trees during the months of May, June, September and October; third, the division of the timber country into districts, and the appointment of police under a superintendent with magisterial powers, whose duty it shall be to detect and punish offenders, and provide for the extinguishment of fires; fourth, the cost of maintenance of this protective force might partially be met by the imposition of a moderate tax on the parties owning or leasing timber lands.

The report was adopted.

Election of Officers.

The Congress then proceeded to the election of officers, as follows:—Hon. Mr. Loring, President; Hon. H. G. Joly, 1st Vice-President; Dr. J. A. Warder, 2nd Vice-President; W. S. Little, Montreal, Secretary; John S. Fay, Massachusetts, Treasurer.

Prof. Hough suggested St. Paul as the place of next meeting of Congress. It was generally thought desirable to have the meeting at or about the same time and place as the American Association for the Advancement of Science, and it was the general opinion that its next meeting would be in Minneapolis, Minnesota.

It was resolved that the fixing of time and place of next meeting be left to the Executive Committee.

Mr. Hicks moved that the Executive Committee appoint referees to prepare papers on legislation with regard to forest fires, prevention and control of forest fires, distribution, technology and forest management of the white pine.

The motion was carried.

Votes of Thanks.

Votes of thanks were then tendered to the Governments of Ontario and Quebec for the interest taken by them in sending delegates to the Congress; to the Mayor of Montreal and citizens generally for the interest taken by them on this occasion; to the press for

reporting proceedings and papers; to the various railway, steamboat and telegraph companies who have afforded facilities to gentlemen attending this Congress.

Dr. Warder moved that the thanks of the Congress are to the Geological Survey, Ottawa, for a set of reports; to the Commissioner of Crown Lands of the Province of Quebec, for specimens of Canadian woods; to the Hon. Mr. Joly for presiding at the meetings; to the citizens of Ottawa for their invitation to visit that city; to the American Association for the Advancement of Science for an invitation to accompany them to Quebec; to the ladies of America for their interest and assistance in the promotion of forestry; to the Montreal Amateur Athletic Association for an invitation to use their library; to gentlemen who have sent valuable papers to the Congress; to Mr. James Little, Montreal, the Nestor of American Forestry, for his long continued efforts on behalf of American Forestry.

Motion agreed to.

This closed the Sessions of the American Forestry Congress in Montreal.

Respectfully submitted,

D. W. Beadle.
Wm. Saunders.
P. C. Dempsey.
Thos. Beall.

GENERAL REPORT ON FORESTRY.

Your several committees, having submitted such particulars as we deem of interest in connection with the recent meetings of the Forestry Congress in Cincinnati and Montreal, propose now to take up in a fuller manner the important subject of Forestry and dwell at greater length on the more practical points connected with this momentous subject as developed and presented in the valuable papers read at the meetings referred to.

It is essential at the outset, to show as far as practicable, the present actual condition of the forests of Ontario, where they are chiefly located and the proportion they bear to the arable land of the Province—a paper read by Prof. Brown at the Forestry Congress in Cincinnati, entitled "Forest and Rainfall in Ontario," contains so much useful information upon this subject as well as upon others, which will be touched upon hereafter, that we present it entire:—

FOREST AND RAINFALL IN ONTARIO.

The first time I had to do with any purely scientific view of trees and climate was in 1867, when I secured the practical recognition of Arboriculture as a science, before the "British Association for the Advancement of Science," when also, with two others, we obtained a sum of money to begin experiments in order to ascertain the real or supposed influence of trees upon rainfall. A very great deal has been said and written on this subject since, yet I am not aware of much that is new, or any clear light through exact reported facts on the American continent, where, of course, conditions are very different, and must be sought for independently of any others throughout the world. We cannot take European conclusions and use them here with any measure of trust, because physical conditions are just the extreme, so to speak, of those averaging in the eastern hemisphere. Hence the necessity of independent experimental action—should experimental work be thought of any value.

From 1855 to 1869 my profession gave me the direct superintendence of planting 21,000,000 trees on two extensive estates in Scotland, along with the regular thinning and clearing of woods according to the system laid down in the work called *The Forester*, of

which my father is author. I mention this principally to show that the aims of this Association ought to have my support, and that the subject of conserving and re-planting in America comes home very warmly.

It needs but a glance at the map of North America to feel that such an immense body of land must possess physical conditions that have both the working and the regulation of its own climate. The older part of Ontario, wedging west as it does into the States, and bounded south and west by great bodies of water is a very peculiar portion of this great block of land under discussion; it is indeed perfectly unique, and hence I beg the particular attention of the convention to some phazes of its forest and rainfall.

I submit first, that there are five active over-ruling agents in the construction of climate thus far inland on a large continent:

1. Geographical position.
2. Configuration of surface—such as altitude.
3. Large bodies of water.
4. Vegetation.
5. Storms from distances.

What, and how much, each does, is not evident, and maybe never will be ascertained.

On the accompanying map I have drafted and indicated some facts with reference to proportions of forest still existing and with reference to the average annual rainfall throughout Ontario proper. From Detroit to Quebec Province boundary is about 500 miles, and from Lake Ontario to Lake Nipissing, 200 miles. The configuration of this triangle is pretty uniform as regards non-possession of any mountains or prairie, but with a marked table land, as shown, immediately south of Lake Huron, nearly butting on the lake fifty miles broad and running south-east for one hundred miles—two-thirds of the distance to Lake Erie. This high land averages 800 feet above Lake Ontario and 500 above Huron. The fine parallel lines represent where over 50 per cent. of the original forest still remains, and the broad stripes where less than 50 per cent. exists. Rainfall from thirty-five to forty inches per annum is shown by the chequered lines; the dotting indicates where less than thirty inches fall, and the remainder of the land receives from thirty to thirty-five inches of rain and snow per annum on an average. The path, or direction of the great storms having their origin *outside* of the Province, and which bring rain, is indicated by the long arrow which has a bearing of N. 65° E.

It appears, therefore, that two-thirds of Ontario is still in possession of from 50 to 75 per cent. of her natural forest, and, let me add, none of it has less than 20 per cent., so that possibly about *one-half over the whole*, still stands.

Now, with all these data on hand, allow me to ask some questions—knowing it is easier to ask than to answer questions:—

(1.) How is it that so little rain falls on the 75 miles of highly wooded neck of land between Lakes Erie and Huron along the River St. Clair?

(2.) Why, immediately thereafter, does heavy rainfall occur all along the shore of Lakes Erie and Ontario up to and a little past Toronto, where tree surface is least?

(3.) Why is rainfall heavy over most of the table land formerly referred to, the greater part of which is well wooded?

(4.) Why is rainfall so small between Lake Ontario and Georgian Bay, over a district embracing Lake Simcoe—part well covered with trees and part having the least proportion?

(5.) Why are all the backwoods north to Lake Nipissing in annual receipt of heavy rain?

(6.) Why is there no heavy annual rainfall on the lake shore or midland counties, east of Toronto?

Permit the following solution:—

(1.) Lakes Erie and Huron are stronger attractions for moisture than a river, small lake and a comparatively flat belt of heavy wooded country. Even an outside storm will be drawn south or north of Detroit by these large bodies of water.

(2.) The well-watered north shore of Lakes Erie and Ontario as far as Toronto, is clearly large lake influence.

1 Over 50 per cent. of Forest remaining.
2 Under ____ do ____
3 From 35 to 40 inches of Rainfall.
4 Under 30 ____ do. ____
Remainder, from 30 to 35 ____ do. ____
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LAKE ONTARIO
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(3.) Three things go to make the heavy rainfall on the table land: altitude, lake contiguity, and tree surface.

(4.) The fourth question is not so evident: The district of low rainfall is partly on the water-shed, and therefore not low lying. Locally otherwise it has a variety of attractive power, and all around rainfall is more plentiful with similar agencies. I am inclined to ascribe this peculiar feature of Ontario rainfall to the agency of the table land, both locally and in breaking outside storms. Take the arrow as a centre path of outside storms that bring rain with them; if it strikes south of Detroit, Lake Erie appropriates it; if north of Detroit the storm is drawn both by Lake Huron and the table land, is sucked into the Georgian Bay and thus clears Lake Simcoe district.

The fifth question requires no answer other than that of a comparatively unbroken forest, attracting more rain with additions from outside storms through Georgian Bay as just indicated.

I cannot see how all north of Lake Ontario and St. Lawrence River there is only a moderate rainfall, considering the size of the lake and the large proportion of heavily timbered country adjoining.

I have thus endeavoured to show some of the physical conditions of our Province, and their intimate connection with tree surface. Of course I do not presume to pronounce decidedly any conclusions on such an open field of our profession, yet it needs no deep scientist to see that trees have a very great deal to do with the climate of a country, so that, in pressing the claims of this Association upon any of our Legislatures and countrymen, facts are not wanting.

It is gratifying to learn from the foregoing paper that in two-thirds of the Province of Ontario from fifty to seventy-five per cent. of the natural forest is still standing, and that in none of it is there less than twenty per cent., and that, taking the Province as a whole, there is probably one-half of the natural forest yet remaining. It is then not too late to adopt a system of forest management which shall secure this source of wealth in perpetuity, by preventing reckless cutting, guarding against losses by fires and the trampling and browsing of cattle, and by encouraging the planting of trees where such planting would be profitable.

The rate at which our forests are being consumed for lumber may be approximately gathered from the following paper, read at the Montreal meeting, by Mr. G. L. Marler, of Montreal, who said that he had an experience of twenty years on the south side of the St. Lawrence, and might, therefore, speak with some authority on the subject of his paper.

THE DENUDATION OF OUR FORESTS.

The subject of this paper—The Denudation of our Forest Trees—has been one which has often presented itself to my mind, and I shall lay before this meeting the most salient points, and endeavour to be brief in my remarks, but at the same time bring before you the most important points.

The Province of Quebec is the principal territory from whence the mercantile lumber is drawn. When I say mercantile lumber I speak of those trees which make up the lumber trade, and are taken from the following lists:—

1st Division—Canadian Trees, Leaf-Bearing.

Quercus	Oak
Ulmus campestris	Elm
Fraxinus	Ash
Betula	Birch
Juglans	Walnut
Juglans cinerea	Butternut

Carya	Hickory
Sideroxylon	Ironwood
Acer	Maple
Tilia Americana	Basswood
Betula	White Birch
Fagus	Beech
Populus	Poplar
Cerasus	Cherry
Balsamodendron	Balm of Gilead
Acer pseudo-platanus	Plain tree
Salix	Willow

2ND DIVISION—EVERGREENS.

Pinus strobus	Pine
Picea	Spruce
Larix	Larch
Cedrus	Cedar
Picea balsamifera	Balsam
Tsuga	Hemlock

There are two large belts of timber land in the Province of Quebec, one on the south side of the St. Lawrence, the other and greater on the north side.

The first extending from Gaspé to the Bay des Chaleurs, which divides it from New Brunswick, thence along the highlands on the boundary line until it strikes the head waters of the Connecticut river, thence along the line of 45 degrees of North Latitude to the St. Lawrence, by which it is bounded in front. This belt consists of about 30,000 square miles.

The other from below the Saguenay to the Ottawa and thence 200 miles north of the St. Lawrence, and consists of about 120,000 square miles.

Until a few years back these great belts of timber land were reached only by the streams running through them, and could only be devastated by the lumberman a few miles each side of these rivers, leaving large spaces untouched by the woodman's axe. But since twenty years this great belt has been intersected by some dozen railroads, cutting up the land like a checker board, and by this means we must look forward that by another ten years this belt will be entirely denuded of all kinds of timber.

The Northern belt is now passing into the same phase as the sister belt—the rivers on the north side are not so numerous as on the south side of the St. Lawrence, but they are of more magnitude and extend farther into the interior—and, like the other belt, is now being also cut across by railways. If we open the Government statistics book we find that the gross returns of the forests for the year 1881 amounts to the neat little sum of $24,802,064, and, as compared with the total exports of the Dominion of Canada, is equal to one-fourth of the total amount, $92,000,826.

In the returns of the Government for the year 1871, the exports for timber were $22,872,591.

Now comparing the year 1881 with the year 1871 there is an increase of $2,000,000.

I have found that in 1871 the cut of timber, as reported to the Government, was:—

	Feet.	Feet.
White pine	24,236,821	26,191,192
Red pine	1,954,371	
Oak	3,302,043	
Tamarac	5,695,963	
Birch	1,939,357	
Elm	1,832,624	
Walnut	117,589	220,570
Butternut	102,981	
Hickory	197,827	

Other kinds	26,290,264	
Pine logs	12,416,408	
Other logs	9,314,557	
Masts	121,685	Feet.
Staves	34,706	M.
Lath wood	25,706	Cords.
Tan-bark	162,521	Cords.
Firewood	8,713,083	Cords.

Now, reducing these several quantities to trees, we have an aggregate of 22,271,384 trees.

If you say 50 trees to the acre, we have a total of acres denuded in one year of 445,428 acres—equal to three townships.

Now there has expired since this return was made 10 years, which gives no less than 30 townships—equal to 3,240 square miles, or three whole counties, supposing each county to consist of ten townships.

Having ascertained the total amount of merchantable or exportable timber, we must not forget the home consumption, which exceeds that exported.

Now what have we done in the way of preservation, very little indeed.

(1) The Quebec Legislature, by an Act of 1882, Chap. XIII, offers a bonus of $12 per acre to any one who will plant an acre of ground with trees, and keep it well preserved.

(2) They have passed an Act, 1882, Chap. XI, "no person shall burn or set fire to any timber for the purpose of clearing land, from 1st July to 1st Sept." The Government, in making their yearly estimates, generally say, amongst the items of revenue, that they will get so and so from forests. Now, when they make or prepare their estimates, they should carefully ponder on this item. Because it is not an annual revenue, it is absolutely taken from capital, which capital is being so rapidly reduced that ere many years the balance must be considered as *nil*, they are killing the goose that is laying the golden egg, in fact they have nearly reached the backbone.

I have now to stop and consider our present position, and ask what must be done for the salvation of our trees—is there any means to replace some of the millions of trees that are cut down annually? I reply in the affirmative; everyone has the power and capacity in aiding in this great work. Does not every tree bear its own seed? and sowing or planting seed is no harder than sowing grain; in so doing you reproduce their kind, and you alter even the temperature of the country; you draw down moisture from the clouds, the trees throw out a certain quantity of carbon, and by the vicinity of trees the health of the surrounding country is benefited in a very large degree.

I have made a calculation that 200 acres (lots such as the present divisions of our townships) planted with a double row of trees, say maple, we will have a belt of trees nearly three miles long and a plantation of 300 sugar or other trees. Experience has shown that from 100 ft. square of well-prepared land, sown with ash and transplanted, you can cover 100 acres from *this 100 square feet*, and have a return after three years, using the smaller plants for hoops, poles, etc., and thinning again and again, until the residue will leave you a fine plantation, and so on with other trees. Oak, walnut, and butternut can be intermixed, as they require longer time to mature. If your soil is well prepared, your farm will begin to give a return after three years at the rate of $10 per acre, increasing year by year to $40, and then the residue will be your park. I have heretofore, through the columns of your newspapers, advocated to the Manitoba emigrants the necessity of taking up a box of our tree seeds. Trees planted in the open ground thrive better and spread out their roots to a greater distance than in the forest, and they have more hold and resistence to the elements,—and I am persuaded that no better investment could be found for the Manitoba farmer, because such a plantation would break the heavy winds that sweep the prairies, and guard his home and crops, and shelter his farm, and give him in return exactly what he has the most need of—timber for all purposes.

Still further light is thrown on this subject by the following paper contributed by Mr. James Little, of Montreal, and read at the Cincinnati meeting :—

THE WHITE PINE FORESTS OF CANADA.

By James Little, of Montreal.

The devastating effects of freshets, the barrenness of sections of the country deprived of timber, and the failure of supplies of water to streams during the summer months (which years ago were well supplied), and which I believe to be mainly due to the destructive habit that has obtained of clearing off too much of the forest land—these questions, however, I leave to others who have given them more thought, and confine my remarks to the condition of our own White Pine forests, and the serious commercial effects which would arise from a total loss of our woodlands, a condition likely soon to reach us unless we immediately adopt measures for their protection, and begin, by tree-planting, to supply the waste.

Labouring, as I may say, almost single handed for a long time to bring our own people, as well as yours, to a proper knowledge of this subject, it is most gratifying to me now to find the papers of your country so generally taking up the question of Forestry, and, when I say that I wish your association the greatest success, it but faintly expresses my feelings, and I hope that the eminent men, who are now giving their minds to this great question, having the valuable statistical information that Professor Sargent has obtained to aid them, will keep it before the people till a proper appreciation of its importance is generally acknowledged.

I may remark that, while my efforts have been mainly directed towards the protection from destruction of the forests of White Pine, it has been painful to me to witness that our other commercial woods, such as walnut, once so abundant in certain sections that farmers used it for fence rails, and oak and ash, which were for long a great source of revenue to the country, are nearly all gone, and our pine, spruce, birch, and tamarac are following so fast that we will soon have nothing left of commercial value; and the same process of denudation has gone on in your own limited area of woodland, as is so plainly shown in Professor Brewer's excellent map, published in connection with the census of 1870, where the area of treeless territory, as compared with woodlands, gives your country the appearance of a large, cleared farm with patches of woodland on its outer edges.

I know that the idea prevails, on your side, that the area of timber land in Canada is so great that the supplies are practically exhaustless, but this idea, I regret to say, is not borne out by the facts. With the view of arriving at some definite knowledge of the quantity, I have consulted with the best authorities we have, and am fully persuaded that 10,000 millions of feet, board measure, will comprise all the merchantable pine of the Provinces of Quebec, Ontario, New Brunswick, and Nova Scotia, and, as we are drawing from these points over one thousand millions annually, less than ten years at our present rate of cutting will use up our whole stock.

It may also be as well to remark, as frequent mention is made of the pine of Newfoundland and the Hudson' Bay country, that, as regards Newfoundland, it is only near the streams, ponds, and bodies of water that the white pine is found, and it was never abundant or to any great extent of a large size or good quality—the best of it has, moreover, been shipped from this country principally to Nova Scotia. The White Pine spoken of near Hudson's Bay evidently refers to the spruce, which is miscalled Pine and White Pine in some of the British markets. The only pine found near there is the Banksian pine, an inferior timber tree, seldom large enough for sawing, and its nothern limit is south of both James' and Hudson's Bays, as may be seen on Prof. Bell's map showing the northern limit of Canadian trees.

To give anything like a correct estimate of the remaining stock of standing pine timber is most difficult, as the Governments seem to know little or nothing on the subject, and the owners of such property have private reasons for withholding what knowledge

they possess, but the following statistics, which I prepared at the request of Prof. Sargent, gives the result of my investigations.

For the Province of Quebec, we may consider the country south of the St. Lawrence as still having 250 million feet, the principal streams being the St. Francis, Nicolet, and Chaudière; the country on the north shore of the St. Lawrence, east of the city of Quebec, 250 millions, the principal river being the Saguenay; the district north of the St. Lawrence, between Quebec and Montreal, 750 millions, the chief source of supply being the St. Maurice; that on the north shore of the Ottawa, between Montreal and Ottawa city, 1,250 millions, the principal streams being the Gatineau, Lievre, Nation, and Rouge; and from Ottawa to the headwaters of the Ottawa river, on the same side, 2,500 millions, the main sources of supply being the rivers Coulonge, Black, Dumoine, Bear, Maganacippi, and Keepowa, and lakes Temiscaming and Des Quinze, with the lakes and rivers forming the head waters of the Ottawa—making a total for the Province of Quebec of 5,000 millions.

For Ontario we may estimate the streams flowing into the Ottawa as still having 1,250 millions, the chief supplies coming from the Madawaska, Mississippi, Bonnechère, Petawawa, Matawan, and Montreal rivers, the country drained by the waters of the Trent and Moira, 750 millions; the streams entering into Georgian Bay, 750 millions; and supplies from other portions of the Province, 750 millions—making a total for Ontario of 3,500 millions.

The pine still remaining in New Brunswick and Nova Scotia will probably not exceed 1,500 millions. Thus making a total for the four provinces of 10,000 millions—an amount less than one year's consumption of your country.

But, whether the amount may exceed this estimate, which I have made from the best sources of information attainable, or not, there is one thing sure that our hitherto magnificent forests of pine are about gone, and the remark of Mr. Charles Gibb that "our native White Pine may yet be peddled in some parts of our country as a rare exotic, so scarce has it become," is certain to be realized in the near future.

The remainder of this interesting paper appeared in our report of the Cincinnati meeting.

Another and very potent cause of denudation, and one which produces far more disastrous results than the lumberman's axe is

FOREST FIRES.

Previous to the discussion on this important subject, already referred to at some length in our report on the Montreal meeting, Mr. J. K. Ward, of Montreal, read the following very practical paper:—

In appearing before you to-day as a practical lumberman, anything I may say will be based on my experience as such, and should I succeed in contributing ever so little in shaping a policy that will promote the industry we are engaged in, and at the same time do something that will preserve for years to come the material on which that industry depends, we will no doubt get our reward. It is a common saying that cotton is king; this may be a truism in some places, but it will not hold good in Canada, as king lumber reigns over us. In support of this assertion, I will resort to a few figures to show its importance to us as a nation. There is manufactured in Canada approximating to two thousand million feet of lumber and timber B.M. per annum, using up say twelve million saw logs, 18 in. x 12 ft. for pine, and 14 in. x 12 ft. for spruce. Nine-tenths of this lumber is exported, for which we get in return some $25,000,000. To produce the above quantity of timber and lumber it would require 3,000,000 acres of land to be cut over, averaging say 2,000 feet per acre, which I think is a liberal allowance. But it is a difficult question as to how much of our country would yield the quantity above named. There can be no question as to the necessity of taking all the means at our command to make the best use of what standing timber we have, in utilization and protection of it; first, in greater economy in manufacturing, both in the mill and in the woods, turning to better account the slabs, etc., in the former, and discouraging the making of square

timber as much as possible in the latter; second, that on Government lands the law as now applied to pine should extend to spruce and tamarac, *i. e.*, no tree less than twelve inches at the stump should be cut down for commercial purposes; third, the greatest dread of the lumberman, fire, should be more closely watched. In my thirty years of experience, I have come to the conclusion, that the most of the bush fires has been the work of fishermen and hunters, who not only destroy valuable timber the property of the public, but also the shanty and material of the lumbermen; in view of this being the case, I would suggest that the Government who is most interested in the preservation of forests, employ as many men as are thought necessary in each agency, to look after and trace the origin of fires on the public domain, giving them the power to take evidence so as to bring to punishment those who either wantonly or carlessly set fire to or cause the destruction of such valuable property. I would also suggest that no lands unfit for settlement should be offered for sale; from what I have seen in my travels on the rivers running into the St. Lawrence and the Ottawa from the north, a very large proportion of such territory is of this character. In selling lands to settlers I would make it a condition of sale, that twenty acres in every hundred should be given free, and that it should be forever kept as woodland. I would say in conclusion that the lumberman is not the vandal some would have him appear to be; he is usually the forerunner of settlement; on most of our rivers he makes the first roads into the woods; his deserted shanties and stables often become the home of the pioneer farmer, furnishing employment for the young men and their teams, and giving the best market in Canada for his hay and oats, for which he usually gets twice as much at his door as he would down at the front. Neither does he look on trees as enemies, nor cut them down for sport. To the uninitiated travelling through the woods, after the shantymen have taken all they think worth taking, he would hardly notice that the chopper had been there, except for seeing an occasional stump, a few chips or a top of a tree, the great bulk of the timber remaining to attract the rain, hold back the water in its natural beds, and to prevent sudden rises and falls in the rivers, which oftentimes cause serious damage by overflowing the banks or becoming so low that they refuse to do the work they once performed with ease, and the miller sighs for the friend that so fully helped him. To avoid these troubles and have our country remain well wooded for many years, it is but necessary to give the trees indigenous to our country leave to grow, and there will be no necessity to plant. I have no doubt but that much of the land that has been denuded of its timber, would in a few years be covered with a spontaneous growth of wood and so prevent our country from becoming an arid waste, utilizing only that portion of it that can be profitably worked.

While we have not yet experienced the full climatic effects, which eventually arise from denudation carried too far, we may draw lessons of warning from other countries and amend our course before it is too late.

In our report on the Cincinnati meeting is embodied a paper setting forth in a very forcible manner the results of extreme denudation in other countries. The following abstract of a paper read at the Cincinnati meeting by the Hon. David H. Bailey, late Consul-General of the United States for China, resident at Shangai, sets forth the droughts, famines, and floods of that country resulting from deforestation.

DROUGHTS, FLOODS, AND FAMINE IN CHINA,

By Hon. David H. Bailey.

It is generally admitted, he said, by foreigners who have travelled or resided in China, that the ignorance of the people and the apathy of their rulers have resulted in the denudation of their forests over vast tracts of country in many provinces of that extensive empire. To removal of the trees and that herbage which should retain the moisture necessary for the constant fertilization of the soil may be traced, in a large degree, the many appalling droughts and devastating floods which have decimated the people and inundated the country. The tables accompanying this paper, of the droughts and floods

which have occurred in China from the commencement of the T'ing to the end of the Ming dynasty (620-1643), demonstrate the disastrous effects of this deforestation. These droughts not infrequently lead to cannibalism, especially in the latter part of the period named, when, it may be persumed, deforestation had reached its fullest development. Perhaps famine has never attained such fearful proportions as recently, 1876 to 1880, in the five great northern provinces of China, where, out of a population of one hundred millions, in an area of something over three hundred thousand square miles, from ten millions to thirteen millions of people—in some districts six-tenths, in others nine-tenths of the population—perished of starvation. The details of these sufferings furnished by the Committee of Relief, as stated in this paper, are harrowing in the extreme. Human flesh was sold openly in the markets. From eating those who died of starvation, they came to killing the living for food—according to the memorial of the Governor of Honan to the throne; not the poor alone but the wealthy suffered most horribly, and finally fell upon, killed and devoured their own wives, children and parents.

The Committee of Relief, composed of foreigners, long resident in China, attributed this calamity entirely to the extreme denudation of forests, and consequent desiccation of the soil. This deforestation was remarked by the Jesuits a century and a half ago, Shansi, formerly opulent and prosperous, the favourite abode of the princes of the Ming dynasty, has, through four centuries of neglect, deforestation and famine lost its wealth, fertility and prominence. This deforested region has for centuries been subject to the scourage of drought and famine.

The southern portion of the province of Chihli is an enormous plain, once celebrated for its fertility, now a treeless, poverty-stricken waste. Some streams have disappeared to develope in other directions, and the large lake of Pei-hu, noted in the Jesuit maps, has disappeared. The ground becomes covered with a white saline exudation fatal to fruitfulness. Great sand-storms frequently arise from and sweep over its surface, filling the air with sand, which penetrates as far south as Shanghai. For forty miles around Tientsin the soil is desiccated to the depth of seven feet, and below there is nothing but salt earth, abounding in nitrate of soda.

It is a singular commentary on the inconsistency of the Chinese character, to say that they have a superstitious veneration for trees, and yet, in many districts and provinces, they destroy their forests. There is scarcely a village in treeless Shansi without its old sacred tree covered with inscriptions. Yet it seems from this paper of Dr. Bailey's, that China is wealthy in coal fields, such as make the use of wood for fuel unnecessary. Each of these devastated provinces will average more square miles than the state of Ohio.

These tables before mentioned, record 627 droughts within a little more than one thousand years, and in the years from 1328 to 1640, nineteen occasions are recorded where the people in their dire distress resorted to cannibalism. Within one thousand years four of these provinces have on an average been visited by tremendous rains and floods every 21.7 years.

The description of the floods of the Hoang Ho, "China's Sorrow" it is sometimes called, reminds one forcibly of the floods of the Mississippi, to which it furnishes a parallel. The great plains of Chihli are also inundated by the rush of floods from the Petho and Wei Rivers. In A.D. 792 this vast plain was covered with water to the depth of twenty feet. Since the floods of 1871 and 1875, the soil appears to have lost its productive force. The Fen River in Shansi has the same torrent-like propensities, which are characteristic of all the streams in these vast and treeless regions. Many other instances might be given. It is quite certain that these plains, which were once a hive of the human race, are gradually losing a large portion of their population.

The wanton destruction of their forests have not only produced extraordinary floods and droughts destroying millions of people and an incalculable amount of property, accumulated by the toil of persistent and plodding industry, but is slowly preparing a desert out of a soil which was once famous for its fertility. It is a warning to the people of this country.

Turning from the consideration of these lamentable results which have been experienced in the countries referred to, we present a paper setting forth the beneficial effects upon the health of the community resulting from the preservation of a due proportion of forest in every extended area.

FORESTS AND HEALTH.

A PAPER READ BEFORE THE FORESTRY CONGRESS, CINCINNATI, APRIL, 1882,

BY DAN. MILLIKIN, M.D., HAMILTON, O.

Mr. PRESIDENT :—When I attempt to discourse of the influence of forests on health, I am embarrassed, not alone by the importance of the subject, but by the very magnitude of the claim which I feel bound to make for the trees. My thesis is nothing less modest than this, *Trees conduce to health, and the more trees the more health.*

Whence comes our health? Firstly and chiefly it is an inheritance from sound ancestors, next and secondly it comes from personal habits, thirdly it depends on climate, fourthly it depends on the sanitary or insanitary state of one's home.

It cannot be pretended that trees and forests have much to do with the physical constitutions we have inherited from our ancestors, nor even, directly, with our personal habits. It remains for me, therefore, to say something of the influence of trees upon climate, and upon the sanitary condition of homes.

The most obvious and beneficial modification of climate by forests is by the arrest of winds. This action, I am sure, is everlooked by city-bred persons, and by many who have led a rural life, but have not had their eyes unsealed. On a bleak and windy day the beasts of the field may be found standing on the lee side of whatever trees are in their range, and a little investigation in such humble company will show that even a single tree standing in the cutting blast has an invisible wake of calm stretching away to a considerable distance. A thin over-grown hedge, through which one might almost walk, will produce something like a calm in its neighbourhood, and an ordinary forest of deciduous trees absolutely arrests the wind near the earth. I bring up this topic first of all, not to discuss the subject of wind-breaks, for that subject will be well discussed in this Congress, but to remind you that a windy climate is, in general, a bad climate ; that wind interferes with health as well as comfort ; that it pinches hearty persons, and is ruinous to invalids ; that it interferes with good ventilation, and with the moderate uniform warmth which should prevail in our houses. A windy climate is a climate of shivers, and snuffles, and colds, and consumption. Therefore I say that the more trees the less wind, and the more trees the more health.

A less simple and obvious proposition is made when we say that forests modify climate in the matter of temperature. We must confess in the beginning that the mean annual average temperature of a wooded region will be about the same as if it were stripped bare of trees. But mean annual averages have very little to do with health. What concerns the physician and sanitarian most is the extent and the rapidity of the oscillations of temperature, and in this matter, as in all things, the forest is conservative.

For it has been positively ascertained that every tree has a certain body-heat, bred by the chemical and vital processes which take place within its rind. This heat is greater when vital processes are most active, but it is appreciable by the infallible thermometer even when tree-life seems to be dormant in winter. For this reason alone—because each tree is an actual generator of heat—the forest warms the air that sighs and whispers through its branches. We have just noted the fact that comparative calm prevails in the forest, and are hence prepared for a statement that when a cold storm descends upon a region, the forest acts as a reservoir of warm air, which is slowly displaced and is given up to mitigate the chill. Nor may we forget the stores of water which the forest holds in its spongy soil, nor that this water has, of all things in nature, the highest capacity for heat, and, once warmed, can give back more heat than an equal weight of any other substance. Bearing all this in mind, we say that in winter every breath from the woods is warmed and tempered by the hoarded heat of summer.

And what is the influence of the forest on summer temperature? In the first place the body-heat of trees is far lower than the summer temperature. Then, since trees in summer are constantly elevating enormous quantities of water from the earth to the air, they cool the air by so much as the earth's moisture is cool. Trees not only elevate water, but evaporate it into the air, and, knowing this, it is no extravagance to say that every leaf is a refrigerator the whole summer long. Turning our thoughts again to the forest soil, we find that, sheltered from the sun, it slowly gives up by evaporation the moisture accumulated through the winter, and in that way greatly cools the atmosphere. Every process whereby the air is warmed in the forest in winter, is reversed or discontinued in the summer, and every breath that comes from the woods in summer is tempered by something of the winter's cold.

In 1875 Ebermeyer of Bavaria enlightened us as to this power of the forest to equalize the diurnal and seasonal vibrations of temperature, and his doctrines have been confirmed by further tests. He found that during the day there was, in summer, a steady outflow of cool air from the forest at the level of the earth, while during the night the forest remained warmer, and received an inflow of air from the open country. Extending his thermometric studies over many months he found that the maximum temperature of the forest was 9° F. lower than the maximum in adjacent open spaces, and the minimum temperature of the forest was nearly as much higher than in the adjacent open spaces.

The forest, again, has a governing, restraining, conservative influence on another of the conditions which constitute a climate, namely, the humidity of the atmosphere. The secret of this influence lies partly in the soil. The forest soil, in the first place, is traversed by roots, living and dead, and these are so many conduits to conduct rain-water into the soil. Over the subsoil so pierced and traversed by roots, is a heavy layer of humus, highly absorbent and hygroscopic, over all this is a layer of leaves, twigs, branches, bark and moss, and, as our great, dead master has taught us in his latest lesson, through all and above all these layers of the forest soil are the channels of earth worms, and the fine earth which they have elaborated. So constructed, the soil of woods is actually an enormous sponge, with incredible power of arresting and detaining rain-water; and, saturated in cool, rainy seasons it becomes a vast reservoir from which the parched air of dry seasons acquires needed humidity. Nor must we in this connection forget to mention again the enormous evaporation from the leaves—which, by the way, is greatest when it is most needed.

How just a treasurer is the forest, then, of all the elements of a good climate! It is an agent that can mitigate the fierce heats of summer, and detain and warm the biting winds of winter; and hoard up the redundant rains to yield a portion again when summer has parched soil and air alike. Impressed by truths like these, Alexander Buchan has declared that the climate of forests is so equable, that it is comparable only to the climate of islands.

But what has all this to do with health? A variable climate is an unwholesome climate. Other things being equal—an equable climate is a good climate. Sudden excess of heat is enervating; sudden excess of cold is the common breeder of catarrhal diseases in general, of pulmonary diseases, acute and chronic, and of the more acute inflammatory diseases of the abdominal viscera.

Of the relations of health to atmospheric moisture we know only this: that sudden and incessant changes are injurious. There are salubrious dry climates, and salubrious moist climates, but the climate that is notably dry to-day and notably moist to-morrow, is not a good one from the physician's stand-point.

A common objection to these doctrines is often put in this shape:—Climate is a result of world-wide causes. Only a small portion of the earth's surface is dry land, and only a small fraction of the land can ever be covered with forest. The influence of the forest upon climate is therefore trivial.

The truth is, however, that while the general climate of the wide world is hardly affected by the existence of forests, yet local climate is greatly modified, and, in almost all cases, is modified for the better. The natural investment of animals, and our own artificial clothing does nothing to modify the temperature of the world or of the cosmos, yet how invaluable is it to the individual!

Treeless regions are the breeding places of storms that seriously affect health in regions like this, that are not yet wholly deforested. If we enquire whence comes the deadly cold storms that so fearfully increase the winter mortality of children, and of old persons in the Mississippi Valley, the unerring arrows of the Signal Service point to the north-west. Seeking further, we find that these "blizzards" come into the United States from a region still further to the north-west, and meteorologists are assured that they are bred upon the vast treeless plains in the British possessions, where radiation is unchecked by an arboreal investment. It is believed, also, that the sudden, cold, north-east storms, which in Europe so greatly increase the winter mortality, descend from the great treeless plateau of Asia, bringing a taste of Siberian horror to the capitals of Europe. It is perfectly certain that the deadly dry winds which sometimes sweep, hissing hot, across our Mississippi Valley are engendered in the great treeless region lying this side of the Rocky Mountains, and it is equally certain that similar winds coming into Europe from the south are bred in the treeless African Dessert. Russia, even Russia, with all her inertia, is moving to increase the extent of her Siberian forests for climatic reasons. It is certain that, for economic reasons, the great prairies traversed by the terrible "blizzards" will soon become a fairly wooded country. Kansas, Nebraska, Missouri, Iowa, and Illinois are planting trees, and even Colorado is afforesting a portion of her domain, until, perhaps, in this very spot men now living may live to see a climate more equable in summer and in winter.

We may partly understand what may be done to ameliorate climate by tree-planting, when we reflect upon the frightful mischief that has been done by the axe in many quarters of the world. In Europe, within recent historic times, the climate has so greatly changed that the limits of vine-growing have been continuously contracting. Beautiful Palestine, ravished of her woods, has become an uncanny desert with a fickle climate. The Appenines have been stripped, and the adjacent parts of Spain are noted no longer for salubrity—but for terrible deluges, drouths and cold storms. The climate of New England has been greatly modified in the last one hundred and fifty years, and always for the worse. In Algiers marked changes in the climate have followed upon the deforesting of extensive tracts, and wonderful results have followed the systematic planting of other regions. The islands of the sea have been made so many isolated experimental stations, where men have learned how essential to health the forests are; while on some of them the conclusive test of re-foresting has been made with a return of showers, and a more equable distribution of heat and cold. Saint Jago, the chief of the Cape de Verde Archipelago, was, at its discovery, clothed with a forest which has been recklessly destroyed. Rain is now lacking sometimes for a whole year, a green leaf can scarcely be detected over what were once fertile lava plains, while certain of the harbours of the island have been filled up by the precious soil of the island, which has been carried down by the fierce torrents which, alternating with drouth, curses this naked island. Similar results have followed the destruction of forests on St. Helena, the Mauritius, and certain of the Canary Islands. For this central region of the North American continent we must admit that, while trade and the arts have left our hills more bare than ever they were before, there was not in eighty years a summer so horribly hot as the last summer, nor in the memory of man a winter so rigorous as that which preceded. If, in that year, a pestilence had come upon us, it would have been the subject of our thoughts, our plans, our prayers, and our dreams. But no pestilence stalking through the land ever caused half the mortality that was caused by that frightful winter of 1880-81, and the sickening summer that followed. To arrest a pestilence by quarantine, the State sternly interrupts trade, travel and pleasure; but the far greater mortality from the increasing fickleness and cruelty of our climate can be arrested by the gentlest means. It is needed only that our broad States shall have one fourth or one fifth of their surface covered with trees—which, by the way, may be so distributed as to increase the value and producing power of lands. It is needed only that the road-sides shall be well planted, that all hills shall be fixed forever with woods, that the rivers shall be fringed with appropriate species, and that woods shall be wood in fact, and not struggling collections of the dying monarchs of the primeval forest. Along with a better climate will come not only the better health and longer lives, which I preach to-day, but forgotten springs will gush anew from the

hills, the attenuated streams will fill their banks again—and yield us a better fish supply —and will cease to drown the valleys with floods after every rain.

Trees, I believe, chemically alter the atmosphere in such a way as to increase its salubrity. They are living, breathing organisms and, under the stimulus of sun-light, they exhale a great quantity of oxygen. A portion of oxygen thus exhaled, assumes that allotropic form which the chemists have named *ozone*. By virtue of its powerful oxidizing powers, ozone probably conduces to health in a high degree. It is produced in the forest not only by exhalation from the leaves, but also by the slow oxidation of essential oils such as lend their perfume to aromatic plants and fragrant flowers. It is produced, also, wherever slow oxidation or fermentation takes place, and especially where turpentine or terebinthinate compounds are oxidized in the presence of water. For these reasons the air of forests, particularly of pine forests, is charged with a large amount of ozone, while the air of towns has absolutely none.

Ozone disinfects decomposing animal matter and is capable of destroying miasms and disease-germs, and constantly conduces to health.

And now, having so far advocated our thesis that the more trees the more health, common scientific fairness requires us to entertain the reverse side of the question and enquire if ever, under any circumstances, trees are injurious to health.

The popular opinion regards the woods as the breeding-place of malaria. The popular opinion in this embodies a vulgar error. All the conditions for breeding malaria are not known; it is a fickle crop and will not grow where all known essential conditions seem to be present. But we know that air, moisture and abundant sun-light are essential, and in the dark, primeval woods of all countries, the malarial fevers are almost unknown. About the margins of streams and rivers, in half-dried swamps, and especially where salt and fresh waters meet in brackish swamps, the malarial poison is most concentrated and malignant. It is very true that the pioneers who were woodmen, were great sufferers from ague and intermittent and remittent fevers. But this, I think, was not because they lived in the woods, but because they were compelled to clear away the forest and admit the sun-light, and turn the virgin soil. Freshly exposed soil is unfortunately the favourite nidus of the malarial poison. The draining of ponds, and necessary excavations for streets, roads and railways, have in hundreds of instances developed severe endemics of this sort. But the connection of shaded soil and malarial diseases, has no scientific justification.

And we may even go further and declare that plant life is absolutely antagonistic to malaria. In this region where there are many of its isolated breeding-places, it cannot escape notice that even a thin or narrow belt of woods will defend a strip of territory from the malarial influence. In some mysterious way the poison is neutralized in traversing the woods, and health prevails on one side as surely as disease reigns on the other.

Bowditch, of Massachusetts, in 1862, presented facts which led almost to a demonstration that soil-moisture develops pulmonary consumption, and by him we should be warned. It is possible that on damp, tenacious soils trees may be so massed about dwellings as to keep the soil too damp. Supposing a house to stand on good rolling soil, well drained and underdrained, this would be impossible, but, out of abundant caution, it would be well to keep dense masses of shade some little distance from dwelling-houses. Let the trees that come into closest companionship and look into our windows be few; let them come not too near. And let them be lofty, so that their shadows may sweep over long arcs as the sun swings round his daily course. Then the dangers of damp soil and damp walls will be wholly forestalled.

While they should not come too near, there is one good sanitary reason why trees should come somewhat near our homes. Civilization requires and creates fixed homes, and the social instinct tends to bring these homes into groups. From this it comes to pass that the soil about our dwellings becomes saturated and oversaturated with organic matter. The defilement of the surface soil with vast quantities of slops and suds and scraps of organic matter is an evil, but the continual pollution of the sub-soil, is a far more serious matter. Superficial filth may be removed, and, if not removed, is capable of oxidation, so as to become innocent in time. But subterranean filth can neither be traced nor removed, and is beyond the influence of oxidizing influences of the air.

One sort of subterranean filth is especially dangerous. To dispose harmlessly of the excreta of men and animals, is a problem which baffles civilization. On farms and in villages the vault or cess-pool, if water-tight, becomes a hideous, festering mass of liquid rottenness; if, as is common, it is not water-tight, its contents are only a little drier, because the liquid filth permeates the sub-soil and oozes away. Oozes away, whither? Profitable inquiry!

For obvious reasons most towns and villages lie in valleys and are built upon alluvium—gravel, sand, or sandy loam—a sort of soil that is very permeable to all sorts of fluid, clean or unclean. The wells, we must remember, are dug in this same sub-soil, and are dug deeper than the vaults, sometimes fifteen and rarely more than fifty feet distant from the vault or cess-pool. The uniform distribution of filth through the sub-soil of towns, situated according to our hypothesis, would be only a question of time, but, since the soil-moisture is constantly changing its level with the varying rainfall and the varying level of water in the streams near by, the distribution of organic matter through the deeper strata of the earth takes place with great rapidity, and becomes a question of very brief time.

It is a curious fact that only savages dispose of their dead in a way to make them harmless to the living. In lower grades of culture, men have been wont to make harmless disinfected mummies of their dead, or have left them on elevated platforms where the dangerous products of decomposition are diluted and destroyed in the great atmospheric ocean, or have exposed them to the carrion-eating birds of the air, or have consumed them with purifying fire. Under our grade of civilization, the dead are rotted underground, near the church, and the church is never far from the crowded haunts of living men.

The microscopist, the sanitarian, the physiologist, the practical physician and the surgeon, each on his own line of investigation, has come to the same conclusion as regards these subterranean stores of filth. They are not only poisons themselves, causing general malaise and gravely lowering the vital powers, but they constitute a nidus, wherein low organisms breed—organisms which are associated with the most deadly diseases, typhus fever, typhoid fever, diptheria, etc., etc.

It was from such deposits of organic matter, that the mediæval plagues took their origin. It is in such depots of accumulated rottenness, that the Asiatic cholera grows strong and malignant, and carries death to all continents. It was this sort of filth, hidden for long years under Sandringham Palace, that poisoned the heir of England, and well-nigh cost him his life.

And what can we do with it? We dare not dig into it, if there were men and money enough in the world. We cannot inject chemicals into the soil to decompose it, for who will tell us how deeply, or how far, or in what directions filth will extend itself from a given focus of distribution? But the blessed trees, we may be sure, will traverse all strata of the earth in search of organic matter; their roots find it and feed upon it; they alter it, chemically, as essentially as if it were burned; and they elevate it into the air in forms of beauty and of use.

I have now completed such brief review of the influence of the forest on man's physical health, as the occasion allows. But I trust you will suffer me to use an abused term and say that the forest has an influence upon the æsthetic sense, which a liberal sanitarian and wise physican cannot afford to ignore. Life without beauty is a dead and unwholesome thing, truly, though we have heard the doctrine preached from unworthy lips of late, and whatsoever ministers to the æsthetic sense, ministers to complete health. We may not scout at smaller vegetables while we praise the trees, for all things that grow are of use. Even thistles were made for asses to chew, and sunflowers for the delectation of more refined donkeys. But trees, I think, are fit to minister to a manly man's thirst for beauty. A treeless land is not commonly a land of health for body or soul, and he who enters into the companionship of trees, knows more than most men know of æsthetics.

Beauty and goodness we know are closely akin. As the sturdiest crops and the most exquisite wild-flowers grow near the woods, so the greatest and the rarest of mankind and sweet womankind have been educated, nurtured, developed and inspired by the woods. A very great part of our wisdom had its strong roots in the academic groves of Greece.

The great monarchs of the earth have been the forest kings. Of our American Presidents only two or three could be called city-bred, and the six Presidents whom the world would now agree to call great—Washington, Jefferson, Jackson, Lincoln, Grant and Garfield—all of these were born in the woods, were educated in the woods and by the woods, and spent their stout young manhood among the trees. Most of the masters in literature, were masters of wood-craft. The true poets are all forest-poets. The great writers of romance are nearly all lovers of trees, and the most wonderful of all imaginations has made us actually know the Forest of Arden, and Birnam Wood, and Windsor Forest. The inspiration of the woods has always been a healthy, hearty one, for great men and small men alike, and I know there are none here who cannot find in the woods all that is worth asking for, as in the chief petition of Lowell's "Beggar":—

"A little of thy steadfastness,
Rounded with leafy gracefulness,
Old oak, give me,—
That the world's blast may round me blow,
And I yield gently to and fro,
While my stout-hearted trunk below,
And firm-set roots unshaken be."

The sanitary value of forests, according to our present light, is thus summed up by George L. Andrew, M.D., of Laporte, Indiana, in his paper on this subject:—

1. Forests increase the amount of condensation over their own areas, but by reason of the amount intercepted by their leaves and stems, the annual rain-fall at the earth's surface is not, perhaps, materially affected by their presence or absence, in regions well covered with other vegetation and thoroughly cultivated.

2. By means of their interlaced roots, mosses, lichens and humus, they check the efflux of superflous rain-fall, thus regulating the water supply in streams and springs, and decreasing the proportion of the annual percipitation that is borne to the sea by the natural drainage of the country.

3. Forests diminish the evaporation from the earth's surface—the evaporation from a surface of water in the woods was 64 per cent. less than outside the same—but this deficiency is much more than compensated by the increased evaporation from the leaves.

4. Trees modify temperature; wooded countries being warmer in winter and cooler in summer. This they do by radiation, but owing to their slow conducting power the times of their daily maximum and minimum do not occur until some hours after the same phases in the temperature of the air, thus distributing the heat of the day more equally over the twenty-four hours. The yearly variations of temperature in the woods and the daily variations in summer are less than in the open fields, and it is well known than an equable temperature is the most conducive to health.

5. Forests and tree belts are of undoubted value in preventing the dissemination of malaria.

6. Trees are of positive sanitary value in affording shelter from the excessive heat of the sun, and from the violence of winds.

7. The importance of devoting to forests all regions unfit for profitable culture, and of protecting them by an enlightened public sentiment, as well as by legal enactment, is both a sanitary and economical necessity.

The following papers present further arguments of a similar character for the preservation of a due proportion of our forests:—

WHY SHOULD WE PLANT TREES?

By Dr. A. Eby, Sebringsville, Ont.

As trees perform an important part in the economy of nature, wisdom demands of us that we should assist her in her work, instead of interfering with it, as is too often the case. Trees are not only valuable for their fruit and their timber, but are useful for their moderating influence on the climate. Not only do trees act as wind-breaks—a

very important matter to the agriculturist—but they act as storehouses of moisture and distributors of electricity. The influence of trees, and especially forests, on the rain-fall and the flow of springs is so well known by the dire experience of the old world, that it is only necessary here to refer to it. Doubtless the cyclones, so common and so destructive in the Western States, whether we consider them as violent winds only, or as discharges of electricity, are due to the great scarcity of trees on the prairies. The prairies being nearly destitute of trees, the winds sweep on unchecked, and when one current comes in contact with another, coming from a different direction, the united current takes a direction of its own and sweeps on with resistless fury until its force is spent. So with electric storms; on account of the great want of trees, there is no adjacent communicating medium between the earth and the air. The positive electricity in the air is not neutralized by the negative electricity of the earth, so each gains strength by accumulation until they meet with some intercommunicating objects, when a discharge takes place with destructive force. What now occurs on the treeless prairies will take place in the older states, and in this Province if the destruction of our forests is permitted to continue without compensating for it by the planting of trees sufficient for the harmonious working of the laws of nature.

But trees not only act as distributors of electricity, but as storehouses of moisture. The immense surface of the leaves, when the surrounding atmosphere becomes dry, exhales moisture and thus retards the destructive effect of a dry atmosphere on vegetation. Prof. Williams, of Vermont, obtained sixteen grains of water in six hours from two leaves and a bud which he had sealed up in a bottle while yet attached to the tree. From this we may form some idea of the immense amount of moisture that is thrown off by a large tree. It has been shown that the evaporation from an acre of forest, during a whole season, is much larger than the total amount of rain-fall it receives during the some period. Where do the trees obtain this excess of moisture exhaled over the amount received by the rain-fall? It is absorbed from the atmosphere at times when the air is surcharged with moisture, and it is laid up until such time when the surrounding atmosphere again becomes dry.

But trees, and especially forests, by which I mean larger collections of trees, not only act as storehouses of moisture, but of heat. Who has not felt the agreeable sensation of warmth when coming to a forest while out driving during a cool summer night? The leaves prevent the radiance of the heat of the earth, while in the open country on a clear night the heat of the earth is rapidly diffused into space. Thus forests retain warmth a longer time than the open country; and we often find that tender plants near trees have escaped injury by frosts, while those not so protected were destroyed.

We thus see that trees play an important part in the economy of nature during the season of vegetation, but they are also valuable as shelters and wind-breaks during the winter. Even small clusters of trees afford a large amount of shelter against a storm, and who could calculate the beneficial effects that would be produced if several rows of trees were planted along our roadways as well as along line and division fences. Such extensive planting of trees would give us almost the full protection of a forest in the winter, while it would give us cooler and less parched fields in the summer.

I have so far not taken any consideration of the value of trees as timber or fuel. Long before even the next generation will have passed over to the majority, will the present supply of timber be exhausted, so that building material must to a large extent be imported from foreign countries, that are less wasteful of the bounteous supply a kind providence has provided. We owe it to our descendants that we leave the world no worse than we found it. We may call a certain part of this world's goods, be it in lands, in houses, in cattle or sheep, or in gold or silver, or whatever other form it may be in, our own, but in reality we are only the temporary trustees of it. We come naked into the world, and no matter how large an amount of wealth we may acquire, we must leave it all to others, who in turn have to leave it to others again. So in reality we only play the part of trustees while we are here, and as the world no more belongs to the present generation than it did to the one that went before us, it becomes our duty so to administer the estate entrusted to us, as at last to leave it no worse than we found it. We owe it to our successors that we give them a fair chance in the race of life.

We cannot say that we have done so, if by destroying our forests we deprive them of a supply of timber, and prevent the moderating influence exercised in nature by trees, without having made an effort in compensation, by re-planting, for the destruction we have caused. Our successors will not only need timber for building purposes and fuel, but they will require the moderating influence of trees on the atmosphere to render the soil productive, and thus give them a fair chance of existence. Long ere new timber can be grown will the present supply be exhausted, and even the abundant deposits of coal will not be sufficient to supply the demands that will be made on them for fuel, when the supply of wood will be exhausted in the United States and Canada.

If there were no other, and far more urgent reasons why we should plant trees, I would say the immense improvement in the apperance of the country that would result from such general tree planting as I have indicated, should be a sufficient incentive to persons not totally blind to the beautiful, to devote at least one day in each year to tree planting. Who does not admire the beauty of a row of thrifty, vigorous trees growing at the roadside, and who, while driving along a dusty highway, has not longed for the cooling shade of such trees. To encourage tree-planting along the roadways, the owner of the adjoining soil should be given a proprietary interest in the trees planted alongside his land. But not only would the appearance of the country be improved by a row of trees on each side of the road, but if each farm-house were surrounded with a cordon of evergreens, the effect would, in a few years, be so striking that we would feel ourselves a thousandfold repaid for the trouble and expense of planting them. In fact it is surprising that people should be content to spend the long winters of our northern climes with nothing life-like to look upon. Everything the eye falls upon reminds it of death. There is nothing life-like to be seen, nothing to remind it that winter will not last always, but that the summer will in due time return with its green trees and fields. A cordon of evergreen trees around a farm-house gives it a cheerful, inviting appearance even in the most dreary wintry day. It gives rest to the weary eyes when nature all around is shrouded in white.

But the only value of such evergreens around a farm-house would not consist in their appearance or their use as wind-breaks. They would in a few years become the most efficient conductors of electricity; the protection they would give in this way would soon put an end to the business of the lightning-rod men. It need hardly be said that a farm well planted with trees along its boundary and division fences, and having evergreens about the buildings, would at any time, other things being equal, sell more readily and at a better price, than one destitute of trees. The enhancement of the value of a property by planting trees on it should of itself be a sufficient reason to induce men to plant trees extensively.

There is another, and, perhaps, to many men the most important reason why we should plant trees; their commercial value should induce every farmer to engage in tree planting as a source of gain. While some kinds of trees require many years before they have grown sufficiently large to make their wood valuable, others require but a few years growth. Mr. Budd, of Iowa, who has grown trees largely, says: A grove of ten acres (of white ash), thinned to six feet apart, containing 12,000 trees, at twelve years were eight inches in diameter, and thirty-five feet high; the previous thinning paying all expenses of planting and cultivation. Ten feet of the bodies of these trees were worth, for making bent stuff, etc., forty cents each, and the remaining top ten cents, making a total of $6,000 as the profits on ten acres in twelve years, or a yearly profit of $50 per acre. Mr. Everett is said to have sold twenty-three acres of black walnut, of twenty-three years' growth for $27,000, or $50 per acre for each year's growth. What farmer can make an equal amount by growing grain or raising cattle? It may be a long time to wait—from twenty to sixty, and even a hundred years, as is the case with some kinds of trees—for a harvest; but when it does come it is all the more valuable. It, however, does not follow that because the harvest is so far distant, that he that sows it will most likely never reap it, that therefore he will have no reward for his labour. The value of the crop even if not ripe increases with each year. It takes very few years until a properly planted forest will yield sufficient returns by the sale of the thinnings to pay for the labour and the interest on the money invested.

PRESERVATION OF FORESTS.

By Cassius M. Clay, White Hall, Kentucky.

When I speak of the preservation of forests, I propose to consider the conditions which have surrounded myself, and to give my own experience and observations, rather than any attempt at scientific generalization. When Kentucky was first visited by the white man, it was unbroken forest and prairie. The central parts of the State were covered with the finest trees—among which were the yellow poplar or tulip tree, black and white walnut, sugar maple, coffee-bean, oaks, wild cherry, etc. In places there were undergrowth, cane and wild flowers, with wild grape vines in unlimited extent. In the southern or Green River region prairies were frequent, and the growth mostly beech and oaks. Mounds, earth works, flints, pottery, and other evidences of Indian occupancy in ancient times existed everywhere, but for long centuries it had ceased to be the fixed abode of any tribe; but all the tribes of the contiguous States used it for a common hunting ground. The game was mostly buffaloes, elks, deer, the black bear, wolves, foxes, etc. The rivers were full of fish, and the waters frequented by wild fowls. The wild turkey and pheasants were also found here. The better portions of the State are underlaid with limestone, clay, iron ores, and debris, wafted in primitive times by the flow of northern waters, leaving all the elements of plant growth in minute particles on high rolling and alluvial grounds; salt, silica, etc., also abound. Upon such a soil in this genial clime with a good annual rainfall, grew the finest forests in many respects in the world.

The early hunters cared for little but game, and the forests began to be cut down to any great extent only when the agricultural class followed the hunters. The method was to find a good spring of lasting water, and there to build the log hut. To prevent injury from storms and the falling of trees, a "clearing" was generally made, and the house and the cultured fields were in one enclosure. The habit was to girdle the trees, destroy their lives, and as the limbs and trunks rotted and fell, to burn them, and then cultivate. After awhile fruit trees were introduced by seeds and stones. The birds, the woodpecker tribe especially were plenty, bored the dead trees for nests, and lived upon the larvæ of insects, there also nesting themselves. The result was fine fruit of all kinds, and unscathed vegetables. When fruit trees began to be later imported, there were brought with them those many insects, which infest all vegetable growth, and the birds following the destructive axe of the pioneer westward, and falling under the deadly shotgun, leave us to an unequal war with the smaller insects, now man's most destructive enemies.

As a wealthier and more refined class of immigrants succeeded the first two classes, frame, brick, stone, and hewed log houses were built, and some trees began to be preserved from the omnivorous axe. Then trees began to be planted in the place of the original ones—mostly black locust, catalpa, the crooked variety, Lombardy poplars, China trees, and all that class of imported stock, all inferior to the first native growth.

My first recollections were of two rows of Lombardies on the two fronts of our early brick house, flanked on the gable views with out-buildings, and scattering cedars and half-filled lines of yellow pines, with occasional native trees left for their especial size and beauty. The black locust also figured along the fence borders; all in military style! Outside the cleared fields were dense forests of untouched growth with fifty feet or more of shafts with arched tops, excluding the sun; and from the fallen leaves sprang many most delicate wild flowers, with here and there clumps of pawpaws and long snaky grape vines reaching to the top of the highest trees. The cattle and sheep ranged in common, feeding upon scant wild grass, shrubs and limbs of the large growth.

Grasses.

The earliest exotic grass was the English greensward *poa pratensis*,* now the celebrated blue-grass of central Kentucky. It followed civilization, like the honey bee, west-

* The Mason County, Ky., Historical Society lately said that the *poa pratensis* or English grass was indiginous here—a mistake.

ward, and took hold in genial soils, excluding almost all other grasses and weeds. My father was a large land-holder, and rented out much of his land to be tilled by tenants on the shares, raising corn and tobacco, but neither he nor his tenants cut down the outside forests, being confined to fallen trees and limbs for fire-wood. The result was that only on abandoned farms or clearings did the grass take hold. I well remember how, when a very small boy, I went with the slaves to bring home at night the milk cows from a small grass field unfenced, a mile off perhaps, directed by the tinkling of the cow-bell. Now, the reason of this, our honoured President will be shocked to hear, was not to influence climate, or to revere nature by preserving these her greatest works of beauty; but to prevent trespass, and with the hope that in course of time the timber would bring a fair price.

Destruction of Forests.

As soon as the blue-grass began to be appreciated, the forests began to fall under the axe, and fences made of split rails. I give my own experience. I began by "belting" all trees of early decaying wood—beech, buckeye, elms, dog-wood, hackberry, etc.—leaving the durable poplars, walnuts, hickories, oaks, coffee-beans, etc. These trees were cleaned off as they decayed as the "clearing," and under those left were sowed blue-grass, generally on the snow to suit the time and equal distribution of the seed.

I went over twenty-two hundred and fifty acres, including the fields, in this style, cutting briars, weeds, and bushes with scythes till the grass, fed upon by sheep and cattle, formed a sod. These then were lovely parks not excelled in all the world.

Decay of Forests.

Unhappily these isolated trees began an early decay. The reasons are not far off. The roots of trees naturally run near the surface of the soil, seeking air, light, and sunshine. The leaves fall, and, unblown by winds, remain winter and summer—mulch protecting them against drouth and frost. After thinning, the leaves are insufficient or are blown afar off. Then the stems or shafts once shielded by the massed tops of trees from the sun and winds are exposed to both; and, above all, the blue-grass, running near the surface with its matted roots, absorbs moisture and all the elements of growth, and leaves the forests to decay. They begin by dying at the tops and at last perish by the rotting of the centres. So the fine trees which should have lasted centuries have all disappeared in sixty years. Of the native forests the black walnut, the coffee-bean, and the white, burr, and chinkapin oaks are the most durable here.

Happily for me, I left about fifty acres of native forest untouched, and that remains vigorous as in the beginning, when an hundred years or more ago it was first seen.

Fruit Trees.

The peach cleared of the borer, and properly trimmed, will live twenty years or more. All the seedling apple trees have died but one. An hundred-year old pear tree, reduced to a shell and almost a stump, was cut away by me with great reluctance this winter. The grafted apple tree has proved more short lived than the seedling. None of the cherries have lived over the century. The quince has passed away also.

Planted Trees

seem to be in a way to live long, because the limbs being left low, kill the grass and weeds, shelter the shafts, and generally adopt habits of durability. Of the planted trees, all survive which have low limbs: as the walnut, hickory, water maple, and sugar trees. And though the black locusts failed, it was in part, perhaps, owing to an insect which of late years has attacked and eaten up the leaves. Trees planted singly, or in groups, if left with all the branches, bid fair to live as in the original forests.

The Re-Growth of Forests.

In some lands, the pine being cut away, the oak succeeds, and the reverse. I do not

propose to discuss the question of the origin of species of plants or animals, or the elementary creation of the same. The Mosaic account I receive as at present advised, but I am always in favour of full discussion and experiment. In other lands elaborate preparation of soil and seeds and culture are needed to grow forests, even where the rainfall or possible irrigation will allow. But here, in all the woodlands at least, and in most of the cultivated fields, it is only necessary to keep off the stock and the plow, and the original forests will be exactly restored. In the prairies of southern Kentucky, once bare of trees, by these methods oak forests have been every where grown, till by such means and culture the original features of the country are entirely changed. If all the country lying west of the Mississippi river, having a less rainfall annually than twenty inches, be unfit for farming, it will probably be also unfit for forest culture. The facts should be known and submitted to at once, without further disaster there, proved by melancholy experience. Then by artesian wells, local waters, and other means, affording life, support to man and beast, the rich and scant foliage of grass and shrubs of part of the year's growth could be utilized by grazing, and winter hay, and crops suited to the rainy seasons when there are any. Sheep, and Angora and other Asiatic goats, would be well suited to many parts of the Rocky Mountains, where grass and water are found during the year; and where magnificent natural scenery would compensate for the luxuries of more civilized life.

The Effect of Trees upon Health.

Much has been said about the eucalyptus tree destroying malaria. All trees destroy malaria. The Rev. R. J. Breckinridge bought a place on Elkhorn Creek, near Lexington, where the stagnant waters when low in summer and not shaded always produced malaria. He told me that he planted sycamores and shaded the water holes, and the result was the entire disappearance of autumnal fevers.

Trees and Climate.

It has been denied that trees affect the rainfall or climate. How the sum of the rainfall is during late years compared with the old times, I am not prepared to decide. The able papers in this direction given by John R. Proctor and Robert Peter, of the Kentucky Geological Survey, give us ground to say that when the rainfall is annually below twenty inches successful agriculture need hardly be attempted, and this line of rainfall covers vast lands west of the Mississippi river, decreasing as you approach the Rocky Mountains. And when agriculture fails, trees fail also. As at present advised I would say that where there are no trees it is best to stay away. I move in the sphere of experience with more certainty. I remember when the forests were hardly broken here, that springs of water were very frequent and perennial. The rivulets and creeks and rivers had a perpetual flow; these have now changed. The rivulets and creeks are now dried up in summer, and the fish so often caught by me in earlier years are gone, Not one spring in a thousand remains. Indian corn was generally planted in March, and the rains and exhalations of moisture from the surroundings made crops successful every year. Now, the destruction of the forests has lost to us that bed of leaves which was a perpetual reservoir of water for springs and evaporation; aided by the treading of the hard surface, the rain-fall, if the same as of old, rushes off at once, sweeping the soil into the Mississippi delta. The dry winds absorb not only the ancient humidity of the air but drink up the subsoil evaporation. So that our winters are longer, more changeable, and unendurable. Corn can hardly be safely planted till late in April, and drouth too often ruins all in spite of our best efforts.

Now trees do influence rainfall within the limits of forests in a State like Kentucky, where the rain is not precipitated by mountain heights, but by the meeting of warm moist and cold winds. Here one neighbour has plenty of rain, and another scarcely any. And, even if the rainfall should be the same for the whole State, the owners of forests have reason to believe that these wind-breaks are favourable to rain eddies and rain-bearing currents of air. Here is room for future scientific inquiry and experience. One thing I have found out by artificial landscape gardening: that trees planted many deep

towards the south, make the immediate shade trees nearer the mansion cooler. The reason being that as most of our air currents and winds come from the south-west, even a few more feet of shade in that direction give very marked coolness against the hot currents of air from a sun-parched surface. And the question, therefore, must be logically put, if a few trees make such marked difference in the temperature, what must be the effect of great forests in the same direction upon animal comfort and plant growth?

Abstract of an interesting and valuable paper read at the Cincinnati meeting by the Honourable Verplack Colvin, Superintendent of the New York State Adirondack Survey :—

The influence of forests upon the water supply of any given drainage area is directly proportional to the rain-fall, and it is from the standpoint of evaporation and rain-fall that the effect of forests must be considered.

The data for the investigation must be searched for in the east, where the destruction of forest has been great. Here, rather than on the frontiers of civilization, we should look for traces of climatic change, if the destruction of forests lead to any such change.

The records of the United States Signal Service of the mean monthly precipitation in this country for many years had been searched by the lecturer for statistical information on this subject, and he had based upon these records a series of computations which showed where the greatest irregularities in the monthly rain-fall occurred.

These differences were presented in tabular form, and showed a favourable uniform monthly precipitation of rain in the Middle Eastern States. Here it is known that the approximate limit of safety of forest-cutting has been reached, as torrential action began to show itself in sections where much timber had been cut away.

The topography of the country was shown to have a most important bearing upon the quantity effect of forests upon the rain-fall; the mountain ranges, when forest-covered and extending across the path of the south winds, acting as powerful condensers of moisture. The way in which the limbs of trees entangle and kill the wind, to which a house or block of houses forms hardly any obstacle, was explained in an interesting manner, and was shown to be dependent on the angle of incidence.

The true relationship of atmospheric electricity to rain-fall was traced through the re-actions of the correlated force, so often incorrectly termed "latent heat." The limbs, boughs and leaves of the forest were (when considered mechanically) natural machinery most wonderfully adapted to the purpose of grasping upon the atmosphere, and thus causing those dynamic changes which induce the precipitation of moisture.

The forests were, in fact, most singularly complicated condensers, and performed their peculiar office in the atmosphere far better than the most skillfully contrived alembic of the chemist.

Forests were shown to be essential to a uniform rain-fall when existing in the proper localities, as determined by the great local meteorological laws.

A knowledge of the path of storms in any locality, and of the topography—the elevations and depressions, the rivers, marshes and lakes—was shown to be essential to any exact estimate of the limit of safety of the cutting of forests. The only way in which the wide-spread knowledge necessary could be obtained would be by a general system of observation by farmers and others throughout the whole country of the great facts of the local rain-fall, direction of winds, etc., which could be easily done with little trouble.

With these observations, and an accurate system of topographical and forest maps (which every State should have made), it would be possible to make close estimates as to where forests must be preserved, where replanted and where they might be safely cut. To secure this information required the intelligent co-operation of all citizens. The lecturer told of his personal experiences on the mountain peaks of the Adirondacks and Rocky Mountains, and traced the origin of rain from its evaporation by the sun's rays from the sea to its condensation to cloud—and showed how Buy Ballot's law readily enabled meteorologists knowing the path of storms, from a mere knowledge of the present direction of the wind and the area of the last high or low pressure, to determine the probable maximum or minimum liable to follow, and probable change in the direction of the

winds; but that the location of forests greatly modified the exact application of this law, and rendered imperative that we should study the path of storms on exact topographical maps showing the location of forests, and that then only should we be able to make exact predictions.

The important part which trees play in absorbing pollution from the soil is set forth in the following paper, read at the Montreal meeting:—

THE COPPICE FOR THE VILLAGE AND THE FARM.

By Mr. M. C. Read, Hudson, O.

Tree culture serves many purposes besides the production of timber. In fact the climatic and other influences affecting the agricultural interests are the most important considerations for the planting of forest trees not designed merely for shade or ornament.

In village planting, trees can be only sparingly used in the immediate neighbourhood of the dwellings. The same is true of farm-house planting, abundance of sunlight and the free circulation of air are indispensable, which is seriously interferred with by the thick planting sometimes, and too often practiced. A smoothly shaven well-kept lawn is the crowning beauty of a park or village lot. A dense shade makes this impossible, and in all cases it is a difficult, and in many seasons a hopeless undertaking where there is not an abundant supply of water available for frequent sprinkling. This is an indispensable requisite, the want of which will prevent the dweller on the farm or in the village, from enjoying the well-kept grounds which should characterize city residences. After doing what they can in this respect the residents of the village and the country should resort to a mode of planting adjusted to their condition, and this mode is best found in the coppice, a forest in miniature, which, when once established, will take care of itself. On almost every village lot there is some nook or corner in the rear on which such a plantation could be made, into which trees and shrubs should be crowded, without order, in such numbers as will prevent the growth of grass beneath them, with such a mixture of creepers, vines and low growing herbaceous plants, that a dense thicket will be quickly formed, almost impenetrable to man or beast. The beauty of such a thicket will consist in its native untamed wildness, and, if adjacent to a well kept lawn, the two, like two complementary colours brought together, will each enhance the beauty of the other.

The cost of planting such a coppice is trifling, to secure the best results the ground should be well prepared in the fall. Fertilizers added, if needed, and, in the early spring, covered to the depth of three or four inches with leaf mould from the woods. The number of seedling trees, shoots and native flowering plants which will spring up from this dressing will surprise one who has not tried the experiment. For the main planting take the most easily obtained trees and shrubs from the nearest forest. Multitudes of seedlings from four to ten feet high can be gathered, which, without digging, can be pulled up by the roots. By selecting them in that manner, those without large tap roots, the surface feeders will be gathered, and those most readily bear transplanting. As many flowering shrubs, and as many that produce berries edible by the birds as practicable, should be selected. To these should be added our native Clematis, the Virginia Creeper (Clematis Virginia), the Ctaff tree (Celastrus scandens), the frost grape, and as many farm and forest plants as can be readily obtained. For some time this coppice should be a kind of "Botany Bay," to which should be sent every ornamental shrub or flowering plant not needed in the well-kept parts of the grounds.

If, in laying out village plats, ten to forty or more square rods were reserved in the centre of every block, upon which the rear of all the lots of the block would abut, to be planted with such a coppice, it would secure the presence of a multitude of our small insect eating birds, and be of immense value in the immediate sanitary results. The soil of almost every village becomes so polluted from household offal as to literally poison the water of nearly all the wells. Arrangements are almost always made to drain this offal

towards the rear of the lot, where it is generally permitted to soak into the earth. If drained into the central coppice of the block, it would secure a rank and luxuriant growth, which would substantially absorb and neutralize this poisonous drainage. The village would be clothed with grass, which would need no care, which during all the summer months would be vocal with the songs of the birds and which would do more than any sanitary board is likely to do to secure the health of the citizens.

Almost every farm has patches of waste land, only needing enough care to prevent the intrusion of domestic animals, to convert them in a few years into such coppices. In very large parts of the country these patches of waste land are so large and numerous that if they were all thus utilized the full climatic influences to be derived from forest culture would be obtained. The beginning of the planting of such coppices in villages and about farm houses would materially tend to a similar appropriation of all the waste patches, cut swamps, and rocky hills upon the farm. In them the strong growing varieties of trees would gradually overshadow the others and ultimately acquire a growth fitting them for use for timber. But the main advantages would be climatic and sanitary. Every such coppice would discharge the functions of a forest, which isolated trees and wind-breaks do not do. All the rain falling upon them would be absorbed by the earth (or sent back to the air by evaporation) and sinking downwards until impervious strata were reached, would then flow away to become in the aggregate the sources of springs.

In the village the sanitary influence would be of the first importance. The difficulties in the way of the safe distribution of household offal are not fully appreciated. In a small village where there is an efficient board of health and where much more than ordinary care is taken to guard against the pollution of the soil, I have this summer made chemical tests of the water from forty-seven wells taken in consecutive order. All but four of them gave unmistakable evidence of defilement from kitchen slops or human excreta. If the house drainage of each lot could be carried by cemented pipes into such a coppice into the centre of each block, the rank growth of vegetation then induced would absorb and neutralize this poison and accomplish much toward the solution of a very serious and difficult problem. In such a coppice of four square rods the accumulation of night soil of an ordinary family, if properly composted, may be safely spread upon the surface to be rendered innoxious by oxidization or to be appropriated by the growing vegetation. If the kitchen drain came to the surface in it, the deleterious influence of the kitchen slops would probably be fully neutralized. When drainage to a water-course cannot be secured such a termination of the kitchen drain is the best practicable.

The following paper has a general bearing upon the whole subject from a Canadian stand-point, and has been prepared by a well known Canadian:—

FORESTRY IN CANADA.

By A. T. Drummond, Montreal.

Perhaps no trade question has around it at the present time so much interest as that of the conservation of our forests with a view to the continuance of the lumber industry. This industry has once more revived, and very large demands are now being made on our lumber supplies. Public attention cannot, however, be too strongly directed to the fact that these timber supplies are not unlimited. The drain which has been going on for thirty years past on the resources of our forests, has been so vast and so continued that the questions are now being forced on us—for how long a time CAN these resources be depended on, and what efforts are being made to provide for that supply being continuous? It is perfectly clear that under the present system of farming out the public lands, the time is near at hand when the supply of merchantable standing timber will not equal the demands made upon it, and it is imperative that means should at once be adopted to preserve and recuperate these timber lands. Those who are familiar with the localities—each year extending farther northward and westward—where the lumbermen obtain their logs, cannot be blind to the fact that the area in which the pine may be expected to be

found of merchantable size and in fair abundance, is not so extensive but that another few years of working the timber limits to the extent done in the past, must result in a marked diminution in our exports of white pine. It is not with timber as with other agricultural products. Reproduction cannot take place in a year or a decade. It must be recollected that not until the pine is from seventy-five to one hundred years old is it of good merchantable size for square timber, and that thus at least three-quarters of a century would be required to make these timber limits what they were. And what has been the experience in Maine and Michigan? The pine forests of both these States were thought to be inexhaustible, and gave employment to many thousands of men. Bangor, on the Penobscot, was one of the busiest spots in New England—so many mills lined the river banks, and so many vessels frequented the port for lumber. Now the scene is largely changed. The pine lumber manufactured there has fallen from 102,000,000 ft. in 1856 to 63,000,000 ft. in 1866, and to 14,000,000 ft. in 1877, whilst the total production of pine, spruce, and hemlock boards was not in 1877 one-half in amount what it was in 1866. Again, in Michigan, the Saginaw Valley is being rapidly depleted, and to supplement the supply to its numerous mills, whose capacity is 600,000,000 ft., logs have to be brought from other large rivers long distances away. But most important of all is the fact that the lumber journals of the Western States admit that in the three States of Michigan, Wisconsin and Minnesota—the main sources of lumber supply in the West—there does not, with the present demand, remain of standing pine timber sufficient for ten years to come.

Even greater destruction has resulted from forest fires, not only by reason of the immense areas through which the fires sweep, but because both large and small trees are alike destroyed. Another incidental but most important result arises from the fact that after forest fires, the first growth always consists of poplar, birch and other trees, though whether the pine, which is of slower growth, gradually in the course of long years, asserts its position and overshadowing these, in turn replaces them, is a question which observation has not yet had time to settle.

Tree planting has not yet impressed itself on the people of Ontario and Quebec as an idea necessary to carry out. Hitherto, the ambition of most farmers appears to have been to clear the land as soon as possible, and to be content if enough of wood suitable for fuel and farm use is left. Whilst lumber was cheap and the supply appeared almost inexhaustible, it would not appear necessary to most land owners to provide for the future. Besides, men are selfish, and are disinclined to go to labour and expense in regard to what does not promise immediate results, the advantage of which they will not themselves reap. And yet if we revert to the condition of the Ontario peninsula, as it was fifty years ago, abounding in splendid walnut, whitewood, pine and oak trees, nearly all of which have been cut down long since, and when we remember the greatly increased value which, especially walnut, lumber now has, we cannot help seeing of what immense benefit to the rising generation it would be had the trees, as cut down, been at once replaced by young trees of the same species. Already many of these young trees would have been of fair marketable size. The Maine Board of Agriculture in a memorial presented to the State Legislature, very pointedly refers to the duties of individuals on this question. "Men need to be taught," says the memorial, "that we have no moral right to follow blindly an instinct that leads only to present personal advantage, regardless of widespread future evils as a consequence; that we are but tenants of this earth, not owners in perpetuity; and that we have no right to injure the inheritance of those who succeed us, but rather a duty to leave it better for our having occupied it the allotted time. Men need to be taught to plant trees and their children to plant and love them. Owners of good lands in Maine or elsewhere will in the future learn that their bleak fields, if judiciously planted with wood to the extent of 40 per cent. of area, will produce on the remaining 60 per cent. more in all kinds of crops than the whole does now or can be made to do under any other possible course of treatment. Lands well sheltered can and do produce winter wheat in Maine as well as in New England or on the new lands at the West." In accordance with this memorial, the State Legislature provided for exemption for twenty years from taxation of all cleared lands on which forest trees had been successfully cultivated for three years, and maintained in a thriving condition thereafter. Nearly all of

the Northern and Western United States have in this way statutes to encourage the planting and growth of timber trees, and the effect of encouragement in this respect has in the Western States been most valuable.

Prof. Sargent, of Harvard University, tells us that "as moderators of the extremes of heat and cold, the benefits derived from extensive forests are undoubted, and that our climate is gradually changing through their destruction, is apparent to the most casual observer. Our springs are later: our summers are drier, and every year becoming more so; our autumns are carried forward into winter, while our winter climate is subject to far greater changes of temperature than formerly. The total average of snowfall is perhaps as great as ever, but it is certainly less regular and covers the ground for a shorter period than formerly. Twenty years ago peaches were a profitable crop in Massachusetts; now we must depend on New Jersey and Delaware for our supply; and our apples and other orchard fruits now come from beyond the limits of New England. The failure of these and other crops in the older States is generally ascribed to the exhaustion of the soil; but with greater reason it can be referred to the destruction of the forests which sheltered us from the cold winds of the north and west, and which, keeping the soil under their shade cool in summer and warm in winter, acted at once as material barriers, and reservoirs of moisture."

The influence of belts of trees on local climate is, in fact, very marked. They form obstructions to and ward off, on the one hand, the cold winds from the north which would lower the temperature and, on the other hand, the parching winds which would unduly raise the temperature and equally injure vegetation; they break the effects of storms, and in the winter time cause the snow to be equally distributed over the fields, forming thus a uniform protective covering to the ground; and if generally distributed over the western prairies they will promote the more equal distribution of the rainfall, and will prevent the streams from being dried up, as they usually become after midsummer. Observing agriculturists have found that fields protected by belts of trees yield crops much more prolific than those not so sheltered.

In our timber regions the replanting of the pines can be to some extent left to nature, but there is every reason, since the timber limits belong to the Government, and a large annual revenue is derived from them, why the Government should, especially in the lands which have been burned over by forest fires, institute a regular system of tree planting. There is all the greater reason for this because of the fact that, after a forest fire, trees of different species from those which were previously there, usually spring up. The expense would be comparatively trifling, and certainly insignificant, when placed beside the results which posterity would derive from it. To individuals there may seem little inducement to plant pineries which may not be available to the fullest extent for towards three-quarters of a century, but Governments can have no such feeling, considering that what would be done by them would be for the future benefit of the country and a source of revenue in that future as well. What the Governments can and should also do is to, as far as possible, by legislation and the insertion of clauses in their leases of timber limits, prevent the occurence of forest fires and preserve the younger trees from injury at the hands of the lumbermen. The experience which we are yearly realizing of gradually diminishing areas of timber supply and the now nearly exhausted condition of the United States pineries, make this matter a subject of pressing national importance which, if our legislatures do not now take up, they will probably find twenty years hence that it is too late.

The question of tree planting must arise in our North-West, and the sooner it is grappled with, the better for the welfare of the future millions who are expecting to people the vast prairies west of Winnipeg. In the matter of fuel alone, its importance may be estimated from the fact that there are extensive tracts of western territory where the farmers journey from ten to twenty miles by waggon or sleigh in order to obtain fuel, or where they have to rely solely on the wood train which at intervals supplies them; and such farmers are often exposed to positive suffering when extensive snow blockades take place. The prairie farmer, indeed, very soon understands the value of a belt of trees on his farm, not merely as a source of fuel and fencing, but even more as a windbreak warding off the fierce blizzards in winter, and in summer sheltering his growing

crops, fruit trees and stock from the strong prairie winds which, developing into storms, cause almost every season vast injury.

It is not at all improbable that the planting of forests on the prairies in Manitoba, Dakota and Iowa, will be the solution of that most embarrassing problem—the grasshoppers—by affording obstructions to the high winds which bring these insects from their habitats farther west, and by furnishing suitable homes for myriads of birds which would keep the increase of the grasshoppers in check.

The planting of forests will also probably solve the question of the successful growth of fruits in Manitoba and the Northwest. Fruit trees need protection alike from storms and from parching winds, and especially in our western prairie country is this necessary. It has been laid down as almost an axiom in the western States, that the forest trees must precede the fruit trees in order to afford such protection.

In Minnesota an earnest effort has been made to encourage the planting of trees. A State Forestry Association has been organized, and annually offers premiums for the largest number of trees planted on a day in May denominated Arbour Day. It is estimated that in the spring of 1877 there were 5,290,000 trees planted in Minnesota, and of these over half a million were put in on Arbour Day. During the entire planting season of that year it is believed that about ten millions of trees were planted, and of these, that about seventy per cent. have lived.

The question of tree planting is one which should be actively taken up at once in our Northwest. The Government of Manitoba could not grapple with a more pressing subject for legislation, unless it be drainage. The greatest drawbacks against which the Northwest has to contend, from an agricultural point of view, are wet lands, scarcity of timber, and liability to high winds, and, in some localities, to summer frosts. Dakota and Minnesota have equally these drawbacks. The Manitoba Legislature has taken up the question of drainage, and active efforts are now being made in some parts of the country to reclaim the wet lands. To cope with storms and frosts seems hopeless, and yet experience has found the great value of belts of trees around each farm as affording effective shields against these. What the Government there should do is to promote Forestry Associations, and to, in every way, encourage tree planting by exemptions from taxation or by direct premiums or bonuses. Any such encouragement successfully followed up will be returned one hundred fold in the larger and more certain crops, the store of wood for lumber and fuel created by the growing timber, the relief from the monotony of the prairie landscape through the belts of trees dotting the scene on every side, and not least, in a more contented and prosperous community of farmers.

The beneficial results obtained by planting rapid growing trees in the prairie districts of the west, are shown in the paper next submitted.

WIND BREAKS ON THE PRAIRIES.

By Suel Foster, Iowa.

To the President and Members of the Forestry Association:

The natural circulation of the air is no doubt very healthful to both man and beast; but like all the great, wise, and good things the Creator has provided for us, an excess is injurious. Too much cold, too much heat, too much rain, too much drouth, too much wind, too much calm have their evil results. It becomes us, industrious and intelligent men, to modify the excesses in all these elements. When the piercing rays of the sun scorch the tender young plants of the nurseryman, he shields them from half these rays, when too cold in winter he covers with earth, or takes them to the cellar or green-house; when too wet he drains, when too dry he waters. All these things should be managed with economy and they should not cost too much.

A line or belt of trees around the dwelling, the barn, stock-yard, garden, or orchard, is a valuable improvement that no home should neglect; one half the situations in a hilly country and in all the prairie are very uncomfortable without trees; besides it looks like

poverty and wretchedness, not only such a home in a small house, but the larger and more expensive the house, the more barren and forbidding. Show us an artist who will picture a house on the prairie without trees, and such an artist has poverty of design, has missed his calling, and no one will buy the picture; and the home itself will lack value without trees, many times more than their cost, for its lack both of beauty and comfort.

"Lo, the poor Indian"—Although I was in Iowa before they left, I have never seen the marks on the prairie where they had built a wigwam, or seldom even pitched a tent in the open prairie; but they invariably sought the timber, as do the cattle, to shelter themselves from winter winds. If we will have a law to compel a man to school his children, we should have a section to compel the father to set trees to protect his children from the winds and storms of winter.

Now for the fields.—Experience shows that high winds are injurious to the crops; they often break the leaves of the corn, or slit them into shreds, and the growth and yield of any field crop is perceptibly better where protected by a line of trees, and yet farmers object to the trees taking too much of the land, without knowing that the field will yield more if ten per cent. of it has a belt of trees on the north and west sides. I have never heard of any field crop being injured by too close confinement of air by trees; it is thought that this may be the case with orchards. Then trim up the trees at the bottom and thus give half the force of wind. Far more orchards are injured by too much wind than by too little.

Our western farmers now almost entirely use *barbed wire* for new fences, and repair of old ones. The osage hedge was generally set for fences five to twenty-five years ago, which needed no fence-posts; and the farmers neglected planting wood for that purpose, hence a good portion of the thrifty young oaks that cover the bluff lands and groves about the streams of water, have been allowed to grow up until they are ten to fifteen inches in diameter, making good posts. But there is a large proportion of farmers in this prairie country who have no post-timber grove to cut from. They have now come to the time when they begin to say:—"If we had planted post-timber twenty years ago, we should now have a supply of posts."

What shall we plant?—First I would say to the new settler on the frontier, plant the white willow, for the ease of producing trees quickly, by sticking cuttings and stakes into the ground. It answers for fuel, and for fence, for wind break, for a *live tree* fence-post to nail the piles to, or to support the barbed wire. Next have a strip of land ploughed one year, and the next year set a belt of four or more rows four feet apart of Western or Hardy Catalpa on the north and west sides of the farm. It is a safe tree in transplanting, of very rapid growth, and we have abundant evidence, from undoubted authority, of its great durability for posts, sills, bridge-timber, railroad ties. My experience with it, for more than twenty years, fully satisfies me that it is the most valuable tree for the farmers of the Northwest, and all the states where timber planting is done. Although we are a fast people, we have moved very slow in getting the catalpa introduced. BUT WE HAVE DONE IT. A catalpa of my own raising, twenty-two years old, which has had hard usage, having been transplanted three times, was cut last winter, it was fourteen inches in diameter. A writing-desk made from it is very beautiful. Let me step out now and measure some trees I have that are six years from seed. They are six to nine inches in diameter, and twenty to twenty-eight feet high. The best tree in the row of eight was cut off with the axe when two years old, and in four years it has grown seven inches in diameter, and twenty-four feet high. The best way to transplant catalpa, is to cut them off if they are either one, two, or more years old, and set out the root with a short stump. I will this year take roots, one, two, and three years, with the stock cut off, and drop them in the furrow like potatoes, and then cover with the plough. This quality of tree can be had now of nurserymen at $7 to $30 per 1,000 [and for a great deal less, yearlings, first-class $7; second-class for $3.50 per 1,000.—ED.]

When catalpa trees are cut off near the ground they start several shoots, which should all be picked off but one, and when treated in this way they make straight handsome trees for the lawn, blooming early in June (the Southern Catalpa blooms two or three weeks later, and cannot hybridise), the great bunches of large white flowers among the luxuriant

green leaves, intermixing the white and green through the tree-top, like snow on a leafy tree in early autumn, make it a thing of rare beauty.

I might weary your patience by continuing this paper on many other varieties, but the two, willow and catalpa, make a very short list, always taking the best at the same cost, and the difference one to three cents of first cost is repaid more than 100 per cent. a year in culture and growth for the next ten years.

The beneficial effects of shelter-belts between farms and across townships are well set forth in the paper which follows.

TREE PLANTING IN SHELTER-BELTS.

By Dr. John A. Warder, of North Bend, Ohio.

For many years past, upon all suitable occasions, earnest and practical tree-planters of the prairie states have been advocating the introduction of this mode of planting trees. They have urged it persistently by writing and by talking, but better still, and still more eloquently and more convincingly, by the practice of the dogmas they have presented. The arguments of a well-grown shelter-belt on the prairie in a windy winter's day cannot be gainsaid by the most obdurate doubter.

When exposed to the fierce prairie winds it would be well enough to call them by the title of prairie zephyrs, and if sheltered from them by the kindly interposition of a well-grown wind-break of evergreens, or even of deciduous trees, the benefit and the effect upon the local climate cannot be gainsaid. After such a test no one can any longer question the validity of the claim that forests do modify the climate. The fact being demonstrated by the *argumentum ad hominem*, the discussion must end.

But more sensitive, more delicate, and much more accurate tests have been applied, and the effects have been demonstrated by plants themselves, very many of which can now be successfully produced if planted in the same soils, yes, even in the identical stations, where they proved tender, and miserably failed, when planted in the open prairie lands, without these shelter protectors a few short years ago. The more delicate and convincing proofs have been furnished by the use of instruments of precision applied to the solution of this question; their answers have been carefully noted and recorded during continuous years at many forest-stations in Europe, some of these being located in the forests, others in the open lands similarly situated as to soil, exposure, elevation, and alike in all other respects, except the protection of the trees. The results carefully collated and published have demonstrated that the humidity of forest lands is greater, and that the temperature is sensibly moderated—the woods are cooler in the summer and warmer in the winter, thus confirming what every one must have noticed by the test of his own sensations.

Now that which has been found to be so essential on the prairie, and to yield such happy results, in the increased certainty of all agricultural productions, in those vast regions of agricultural lands that are being brought under the dominion of the plow, in the great central portion of the continent which has heretofore been familiarly known as *The West*, must be acknowledged to be a matter of *national importance*.

This truth is appreciated by far-seeing minds, and we have recently had the satisfaction of reading in a recent metropolitan journal an article which has great significance. It being conceded by all intelligent observers that trees and woods do modify the climate in the localities where they exist, and as it is well known their absence in the broad region of open lands that lie beyond the Father of Waters—that part of our continent now has an arid climate—often seriously affects agricultural productions and sometimes utterly destroying the farmer's anticipated harvest, why may we not hope and reasonably expect to see portions, at least, of that large area between the Missouri and the Rocky Mountains reclaimed to agriculture by the judicious planting of forest trees?

Twenty years ago such a proposition was made, and plans were suggested for planting groves on alternate sections entirely across these treeless plains, to demonstrate the

practicability of their production and their great utility, as well as to encourage private enterprise by setting the example.

In a late number of the New York *Evening Post*, these two postulates were set forth by the editor, a man who has correct views respecting the principles of forestry, and who appreciates the national importance of this branch of agriculture. He lays it down :—

(1) "The *East* cannot flourish while the *West* suffers from the occasional drouths," and,

(2) "*The prosperity of the West will depend upon Forest growth.*"

These two propositions are both true, and their serious consideration is worthy the attention of the economist and the statesman. But how shall those forests be produced in sufficient number and to a sufficient extent to be of general benefit? That is a problem yet to be solved. The United States Government has encouraged planting by individual effort in passing the "Timber Act," which gives a farm on the public domain to every settler who will plant a portion of it with trees. This is well and will result in the extension of woodlands. The great railroad corporations begin to plant trees upon the principalities of lands granted them as subsidies by the Government. It is but right that they should do this work, and it will enhance the value of the lands they hold for sale, while the woodlands are producing the supplies of cross-ties, the fuel, and the lumber, for their own and for others' use ; and during all the time they stand, these artificial forests will have exerted a most happy influence upon the climate.

All this may be admitted by some who are more happily situated among the remnants of the ancient woodlands. But are not we also already in danger? We of the naturally timbered regions of the continent, especially those of us whose lands stretch off to the northward and westward of the Alleghanies, forming broad fertile plains that are not broken and mountainous, but level and altogether arable? These lands were heavily timbered when in a state of nature, but in a brief space we have removed these encumbrances, and have appropriated these fertile plains to agriculture. We are still rapidly progressing with this change, and are aided in the work by the wonderfully increasing demand upon the products that is created by the extention of the various manufactures that require wood.

Now, it may well be asked, Are we not in danger of carrying on this work to its extreme limit, and shall we not suffer thereby? That is a momentous question, and one which demands our most serious attention.

Meanwhile, we have something to offer as a substitute for the forest, to those of our fellow citizens who do not feel prepared to plant timber trees extensively and as a crop, more or less extensively, as it is done in thousands of instances by the land-owners of Europe. We offer this plan to those who feel that they cannot spare a single field from the plans and shedules they have laid down for a regular rotation of corn, oats, wheat, and clover, or meadow lands—and also to those who may have on their farms no rocky ledges, no ravines, no steep hill-sides, no odd waste corners, nor overflowed lands, upon which they might advantageously plant trees. They are not asked to give up a single field and turn it into woodland ; but even they who are so happily situated as to the cultivable character of their lands may yet find it greatly to their advantage to plant trees in the manner which is now to be explained. It will be all the more desirable that they should do so, if their farms be surrounded on all sides by other lands equally well adapted to arable crops, and equally free from the waste places so often found on many farms, and which are almost utterly profitless, though always counted in as so many acres by the assessors in making up the tax duplicate.

In such a territory of fertile champaign country, where every farmer in a wide neighbourhood is similarly inclined to crop his whole farm, and where each desires to reap the golden harvest from every acre of which he may be possessed—just there is the great danger of our finding out some of these days that we have too much cleared land in contiguous tracts ; just there are we liable practically to turn our woodland into prairie—and in many parts of the country we are rapidly reaching such a consummation.

Just there, too, is the place at once to institute means that shall obviate the danger which threatens. This is not to be done by relegating a single one of these beautiful

farms back to forest growths. No one shall lose anything by cruel edict, but each for himself, and all collectively, are promised the full fruition of the benefits that will accrue to those who accept the advice and adopt the plan, which *consists in a system of tree belts across the whole township, and across or between the several farms.*

These shelter-belts and wind-breaks, though occupying a portion of the land, will add materially to the productiveness of the soil that is retained in cultivation, and they will in no small degree modify the local climate, which an extreme amount of clearing has already affected by the exposure of such broad contiguous surfaces to the influence of the scorching sunshine, and to the drying and blasting winds.

On the broad and open expanse of surface of the treeless plains of Iowa, where in the northwestern half of the State there is but one acre of woodland to a mile square of 640 acres, these shelter belts have been fairly tried by those who were bold enough to settle in such exposure. Among them Mr. C. E. Whiting has been one of the first and the most extensive planter of trees upon this plan, and for the purpose of modifying the local climate, and in this he has been successful. Mr. Whiting declares that he can well afford to plant the trees and to give up the land they occupy, for, independently of the fuel they already yield him, and the wood for many economical purposes upon his farm, the remaining four-fifths of the land still occupied by his crops will yield him better returns than the whole area would have done if it were all cultivated to the extreme outer boundaries, but exposed to the elements, and not thus protected by these artificial *shelter-belts.*

This kind of tree planting serves the double purpose of replacing the forests which have been destroyed and of modifying the climate. First—it produces wood for fuel and lumber. Second—it also modifies the climate.

These shelter-belts are particularly adapted to level tracts of fertile lands devoted to agriculture, and the broader the area of such lands the greater becomes the necessity for their protection in this way, just as they are needed in the prairie regions.

The planting of these shelters does not supercede the necessity of tree planting also on the waste places, ravines, and corners, where they exist; by all means, let that good work also be done, to supplement the belts in our efforts to replace a proper proportion of the forests we have destroyed.

Here, as elsewhere, in all our artificial forestation, planting directed by human brains is better, and the results will be more satisfactory, than trusting to natural reproduction, for it enables us to do the work more thoroughly, more evenly, and more judiciously, since we can make a selection of the species best adapted to our soils, and best fitted to our necessities, whether for their sheltering effects or for their ultimate wood products.

If, as of necessity on the prairies, you desire to produce an immediate effect in the shelter, you can be gratified by planting the trees of most rapid growth, even though they be of inferior quality. The outer rows of the wind-break may be set with these kinds, and next to them may be placed those of slower growth, whether deciduous or evergreen. Or you may have the effect you desire at first, and better trees afterward, by planting intermediately such as will be coming on more slowly to take the place of the fast growers when they are removed. This will be true of oaks and hickories, or walnuts, planted among poplars and other rapidly growing kinds.

The evergreens should not be mixed with deciduous trees either in the belts or in the groves, but they should always be massed by themselves and planted in separate rows, if we desire them to succeed. In some cases it may be desired to use the evergreens exclusively; and for mere shelter, particulaly in winter, they are exceedingly effective, and a double or quadruple belt will yield more shelter if set with Norway spruce, or some of the pines, than ten rows of almost any of the deciduous class.

The preparation of the land for the shelter-belt should be as thorough as for a crop of grain, and done, of course, with the plow and harrow. Furrows or marks are made at intervals of four feet to receive the plants, which may be set closely as in other plantations, especially as we desire to break the force of the winds as soon as possible.

A single row of trees, especially if they be of evergreen species, will yield a comfortable shelter, but to be effective, and in exposed situations, several rows should be planted occupying a strip of from four to eight rods in width.

The cultivation should be thorough to encourage the rapid and healthy growth of the

young trees, and it should be continued until the plants entirely shade the ground—a varying period, depending upon the character of the trees, and in part upon the breadth of the foliage.

Until the trees have attained sufficient size to protect themselves, it will be necessary to exclude all domestic animals—or, indeed, these should never be admitted to the plantations.

The following papers refer to the proper care of forests, and the conditions which favour their healthy development.

THE PRESERVATION OF FORESTS FROM WANTON DESTRUCTION, AND TREE PLANTING.

By Mr. John Dougall, Editor of the "New York Witness."

The greater part of the North American continent was covered with forests when first invaded by Europeans. These forests had stood for many ages undisturbed, except by the slow decay of one generation of trees, if we may so speak, and the slow growth of another. These operations had been going on simultaneously since the creation, or since the last great convulsion of nature, and the annual falling of leaves and the gradual decay of branches and trunks had covered the earth with a vegetable mould of considerable depth.

A UNIVERSAL MINE OF WEALTH.

This mould, possessing all the elements of fertility, was an immense treasure, everywhere abounding, and tempting the settler to clear away the trees and reap the benefit of the virgin soil. When trees were cut down, a crop, which had probably required several hundred years to grow, was reaped in a few weeks or years, thereby leaving the earth bare, and the vegetable mould was used up by continued cropping in wheat, corn, and potatoes. The writer knew an excellent bush lot which produced great crops at first to be reduced in less than ten years to mere rocks and stones. And this process of exhausting the vegetable soil went on everywhere as fast as settlements advanced. Of course where the subsoil was good and was turned up in part to mix with the vegetable mould fertility continued much longer, but, in course of time, all, except prairie lands, were reduced so much in fertility as to require the application of fertilizers at great expense. Had the soil at first required these fertilizers the progress of settlement would have been exceedingly slow, or more probably there would have been no progress at all.

WAR AGAINST TREES AND ITS EFFECTS.

The labour of cutting down great trees, cutting them into short logs, and piling them up in log heaps to burn, was however, so great, that a feeling of dislike to trees as the settler's natural enemy became general, and the vengeance against them was so great that in extensive regions the land was completely bared, and thus rendered not only unsightly but unsheltered. Bleak winds had full play and droughts parched the earth. What was even worse, the clearing away of trees on the hills and mountains by the settlers, the lumbermen, and forest fires left the snow of winter exposed to the spring sun; and the sudden melting and running off of this accumulation of frozen water made dangerous floods in the streams in early summer, and left those streams nearly dry in the hot season.

CALLING A HALT.

At length the evil results of the indiscriminate cutting down of trees began to be perceived. The improvidence of previous generations was lamented, and efforts to conserve what forests were left and to plant trees gradually became popular. The first class of efforts was directed to preserving a few acres of the original forest in each farm where that still could be done, and merely thinning the trees for firewood, fencing, etc., thus leaving

the smaller trees to grow more rapidly. The grove thus preserved became one of the most necessary and valuable portions of the farm, and that without any labour of ploughing, sowing, or cultivating. It also afforded a delightful shade in hot weather for man and beast.

FORESTS IN THE TERRITORIES.

The preservation of the vast forests in the Territories belonging to the nation attracted attention also, and laws were enacted to protect them from wanton waste. Secretary of the Interior Schurz distinguished himself for endeavouring to enforce these laws, which are very difficult of execution on account of the opportunities lumbermen have in an almost uninhabited region for cutting trees on Government land, and the frequency of forest fires kindled by careless Indians, hunters, trappers, lumbermen, and settlers. These fires often do more damage to forests in a few days than lumbermen could do in as many years, and how to prevent them is yet an unsolved problem.

FORESTRY LAWS.

The only remedy, and that only a partial one, that can be suggested, for the wanton destruction of forests is a national system of Forestry laws, somewhat similar to those of France, Germany, Austria, Norway, and other European countries, which prohibit under severe penalties the injury or destruction of trees by unauthorized persons; and also the kindling of fires or even smoking in the woods. A forest police was created to see to the execution of these laws, and at the same time providing for the utilizing of forests by gradually thinning out and selling the largest trees, so as to leave more room for the smaller ones. In this way the public forests are an annual source of revenue, and after centuries of such management they are in as good condition as they were at first.

JUDICIOUS THINNING.

In passing through Plattsburgh, N.Y., once, the writer saw the Saranac thickly covered with sawed lumber, and he asked an old gentleman if that river was not yet lumbered out. The reply was "I have known it for sixty years, and the quantity of lumber coming down has been pretty much the same all the time. There is as much now as there was sixty years ago." This shows the result of a judicious system of thinning forests.

A COMMISSIONER OF WOODS AND FORESTS.

If the United States and each state had a department of woods and forests with a suitable head and necessary subordinates, much could be done, not only for the preservation of forests belonging to the public, but to persuade settlers to leave a suitable portion of their farms in wood; and to counsel from time to time in public documents, not only care in husbanding present forests, but some general system of tree planting by states, corporations, and individuals, so as to provide a supply of timber for the future.

TREE PLANTING.

The second branch of this great subject is tree planting, and here credit must be given to the U.S. Government for its encouragement of this necessary work in the prairies. The law giving 160 acres to anyone who will plant and maintain for a few years forty acres of trees, has had a great effect already in providing for a future supply of timber in the Prairie States; those groves will also break the terrible prairie blizzards, and, probably, to some extent, attract rain-clouds to mitigate prairie droughts. A fine spirit of tree planting has also been manifested in many cities and villages; and "Arbour Day," or a day set apart in spring for tree-planting, has become, in some parts of the country, an institution for the purpose of beautifying streets and public and private grounds.

PLANTING TREES ON PUBLIC ROAD-SIDES.

The public roads should be lined on each side with trees, which, when grown, would do something towards sheltering and beautifying the country everywhere; but along rail-

roads there should be something more than isolated trees. There should be a rather broad belt on the windy side, thickly planted with the various kinds of trees needed for repairing the roads. This belt would shelter the railway from storms, catch and retain the winter's snow which gives us so much trouble, and before many years supply much useful timber when the supply from other sources might be exhausted.

TREE-PLANTING ON FARMS.

Every farm should have a belt of timber planted all along its windy side, this belt, not less than fifty feet wide, should be planted thickly with the various kinds of trees that grow best and fastest in the neighbourhood, the thinning of which for useful purposes would soon be valuable, whilst the shelter it would give from prevailing winds would be invaluable. All swamps not covered with trees should be planted with white, and red cedar and tamarac, all of which grow best in damp ground, and produce most excellent timber for various purposes. The leaves also of these trees would absorb the unwholesome air which swamps generate.

STONY GROUND.

There is on many farms more or less of ground so rocky that it will not repay the expense of cultivation, and all such spots should be planted with trees. These may be got out of the woods or farm nurseries; or what would be easier, cheaper, and probably much more effectual, the seeds of various kinds of trees could be sown, imitating as nearly as possible the natural processes which have produced all the forests of the country. The seeds of different trees should be gathered in the woods just at the time that they fall naturally, and they should be immediately planted in little shallow holes among the stones, and covered with a little earth. There the rains of autumn, the snows of winter, and the sunshine of spring would bring up quite a crop of young trees, which should be fenced in from cattle and left to themselves. They would require no labour after the first sowing and fencing except subsequent thinning out from year to year of those that were too crowded or most valuable for economic purposes. If hickory nuts, black walnuts, butternuts, chestnuts, and the seeds of sugar maples, pines and spruces were any of them or all of them sown every here and there over the place intended for a grove the most valuable kinds and those that thrive best could be ultimately left to become great trees. After ten years the annual thinning of this grove for firewood, fencing, hop-poles, railway-ties, etc., would probably make it as valuable a part of the farm as any other, and when the black walnut and butternut trees became large enough to be sold to cabinetmakers the value of the grove would be very great. The present race of farmers may say they would not live to see the trees become fit for the cabinetmakers, but none the less would the growth of that grove increase the value of the farm every year, and that whether the owner sold it or left it to his children.

A FORESTRY COMMISSIONER.

What is very much needed as a preliminary to covering of a considerable portion of land with these groves is the advice of scientists and experts as to the kinds of trees suitable for different soils, the rapidity of their growth and the relative value of their wood. This information could be collected and scattered by the judicious commissioner of woods and forests in each state, just as the fish commissioner gives information about fishes. To plant or sow millions of trees is just as necessary as to hatch and distribute millions of food fishes.

THE DOMINION.

With respect to the Dominion of Canada there is great need for tree planting in the fertile valley of the St. Lawrence for a considerable distance around Montreal, and still more need in the prairies of the north-west. In the latter region of vast capabilities, to which much attention is now turned, a system of granting land on condition of planting trees might be most advantageously introduced now, as every year will render such an

arrangement more difficult. The other Provinces of the Dominion are still well supplied with timber, and the system of selling "timber limits" to lumbermen is conservative to the forests, but there is need of great precaution against forest fires or wasteful uses of valuable timber. A capable commissioner of woods and forests for the Dominion would therefore prove a very valuable functionary, if he were not only an expert, but an enthusiast in forestry, as otherwise his appointment would merely add another salary to the expenses of Government.

Mr. THISTLE, Pembroke, suggested that the forest rangers, whose work cease in the spring, should hereafter be employed during the summer in an attempt to preserve the woods from fires.

Mr. E. B. COWPER, Crown Lands Department, Toronto, did not think the time had come when the planting of forest was a practicable question for Ontario or Quebec. Clearing must go on.

Mr. LITTLE, said too much, perhaps, had been made of planting as compared with the preservation of forests, which was of infinitely more importance. He had seen splendid pine destroyed for the sake of clearing land in Florida, which would only grow fifteen bushels of corn to the acre. He scarcely thought that was right. It was like flying in the face of providence.

CONDITIONS OF FOREST GROWTH.

BY BERNHARD E. FERNOW, SLATINGTON, PA.

To clearly understand and devise methods of forest management, and to forsee the results of such, it is primarily essential that the natural conditions of forest growth be first well understood; that the principles be first recognized on which rest forest production. This is the more important, as forestal operations extend over long periods of time, and the results and effects thereof are often recognized only when the growth of many years has been irretrievably injured, thus inflicting a heavy financial loss on the economy.

In this paper the endeavour has been not to produce anything new and original, but rather to so arrange the known facts of the natural sciences which contribute to the understanding of the conditions of plant growth, that they may easily be applied to the study of forest reproduction, a subject important before all to us at this present moment.

As the idea connected with the term "forest" is vague and undefined, I am desirous before I proceed to clear the conception of what *may* or *ought* to be called a forest. When we speak of a forest in connection with the science of forestry, we do not mean a mere collection of trees, a wood or a park, a plantation, but an aggregate of trees or woodlands which are intended and so set aside for the production of timber or lumber. If we speak of planting and cultivating forests, we do not mean the laying out of parks or groves, which have a very different object in view, which present very different conditions of tree growth, and require in consequence very different methods of culture. Forestry has nothing to do with the planting of fruit or ornamental trees, nor indeed with single trees —just as agriculture does not consider the individual wheat plant. The object of forestry is a financial effect, which is represented by the highest rent from the soil through the cultivation of the same for timber growth.

Of the factors which condition forest growth the soil presents itself first to our consideration.

The soil forms the standing place of the forest tree, as it does that of the wheat plant. But this similar use of the same factor must not induce us to assume too close a resemblance between agricultural and forestal conditions of growth.

It is natural that since agriculture and forestry have both to do with the products of the soil they should be compared with each other, and the principles which govern the one are often mistakenly applied to the other. The difference in these two branches o economy is not merely one of financial import. Though both these sciences—or arts i you prefer the term—have to deal with the products of the soil, this factor takes a very

different part in each. The writer has seen numerous statements in books, papers and journals in this country, pointing out the necessity of a change in species in renovating a forest, thus applying the rules accepted in agriculture on the authority of Liebeg, for the rotation of crops. Anyone who has had to do with forestry, however, will know that not only is the same species of tree propagated on the same place for centuries, but that, at least with some species, the production increases the longer they are propagated on the same ground. That the foliage falling every year and accumulating does in a degree replace the manuring and plowing practiced in agriculture, is not the only cause why the same species can grow and be reproduced on the same place for a thousand years, as is the case with extensive beech, fir and spruce forests in Germany. From this experience it would appear that the system of rotation which we see the farmer deems it necessary to apply in the tillage and manuring of his soil, is unnecessary to the forester.

We shall at once see the reason when we consider the aims of the two.

The farmer's manipulations tend to increase the soluble inorganic elements of the soil, in order to get the highest yield from his field. He applies his energy to produce the greatest amount of protein compounds and with these to remove the maximum of sulphur and phosphorus. He does not pretend, as does the forester, to raise plants in their natural condition, but only such as have been brought by a continued cultivation to an abnormal state, developing one part to the detriment of another. In Asia, the native country of the wheat, our cereals do not differ in their habitus from the common grass. In Chili, in its native state the potato produces bulbs not larger than a pea, and according to Darwin the yield of one acre would not suffice to sustain for one year the life of one Irish family. It is the *abnormal* abstraction from the soil of such enormous quantities of mineral constituents for the formation of amylon, gluten, dextrin, sugars, etc., which necessitates the replacing, in the form of manure of these elements, which are taken from the soil with the reaping of the grain, or, since the different plants abstract different quantities and qualities of the different inorganic elements from the soil, calls for a rotation of plants.

The experiments of Pollstorffe Wiegman have beyond doubt demonstrated that the inorganic bases of the soil form an essential factor for the development of all vegetable life, and the quantities of the same, as found in the ashes of different plants, may be considered as indicating the amount of these materials needed for their full development. We have said that plants differ in the quantity and in the kind of their mineral ingredients very greatly, some of these existing in large quantities and in every soil, others almost entirely lacking in many and only found in small quantities in others.

Now to make a proportional comparison of plants with regard to the impoverishment of soil, which they severally produce, it is import to determine the kinds and amounts of mineral bases each plant requires. A few results from many analyses by good authorities on this point may suffice to show the position of forestry to this question.

Whilst the percentum of inorganic bases in all kinds of wood scarcely ever exceeds three per cent. and mostly remains below one per cent. of the dry substances, we find the ashes from hay six per cent., wheat and rye straw a little over four per cent., and that from oat chaff not less than eighteen per cent. The farmers reap grain and straw, while the forester, if he consults his own interests, allows twigs and leaves, which contain the greatest part of the inorganic constituents of the tree, to remain on the ground.

If we compare the amount of mineral substances which are severally removed by a field crop and a timber-growth, we find that a wheat crop abstracts from the same area five times as much inorganic bases as the beech, ten times as much as the pine ; the turnip ten times the amount of the beech and twenty-two times that of the pine.

From this comparison of well authenticated calculations it would appear that tree-culture has the advantage over agriculture as regards the quantity of inorganic bases required.

Still more favourably stands the case if we compare them qualitatively.

The wheat, for instance, yields nearly from one hectare, according to Fresenius, 32.55 kilo of potassium, or five times as much as the beech and nearly ten times as much as the pine ; of phosphoric acid 20.31 kilo, which is five times as much as the beech and ten times as much as the pine ; of sulphuric acid 20.58 kilo, that is fifty-seven times as much

as either tree ; of silicic acid 129.35 kilo, or thirty-seven times the amount of the beech, and as much as one hundred and forty-three times of the pine. It is not to be forgotten that sulphuric and phosphoric acids are very scarce in any soil.

The beech, however, requires considerably more lime than wheat, the latter yielding 12.93 kilo per acre to 20.29 kilo for the beech.

Whilst then these trees, and undoubtedly all others, use chiefly these inorganic elements, which appear abundantly in every soil, agriculture robs the soil of its rarest components.

We may here adduce the experience of farmers, that the winter crops do not need so much manuring as summer crops, and that the former prosper even on a soil of less mineral vigour.

This may be explained by the fact that the winter crops have a longer term of vegetation, and during the same find more opportunity to supply themselves and assimilate the necessary inorganic elements ; for the summer crops, on the contrary, it is necessary that the soil should be either well manured or easily decomposable. Our woody plants enjoy, like the winter crops, a long term of vegetation, and consequently, can prosper on soils that are slow to decompose.

We have then, from a theoretical point of view, sufficient reason to maintain that the production of timber is much less dependent, nay almost entirely independent of the mineral composition of the soil. This truth we could easily demonstrate by observations from the practice in Germany, where on the mica sand of the Main plain, and the sea sand of the North German plain, the poorest soils in regard to chemical composition, the finest growths of pine and beech may be found. Whoever has travelled through Saxon Switzerland, will agree that on the sandstone of that region, which forms one of the poorest soils, in moist situations, beech, fir, and spruce, species which require favourable conditions of growth, prosper exceedingly.

That it is not the mineralogic condition of the soil, but rather its humidity, which determines the forest growth, may often be observed, when on a soil of the same origin and mineralogical composition you find here a most excellent growth, whilst on the drier portions the growth is considerably retarded and stunted.

We may claim then, that any soil in its natural condition, *i. e.* which has not been used for agricultural purposes, contains sufficient inorganic elements for any timber-growth ; that therefore the change of species observed in this country can hardly be attributable to an exhaustation of the soil, but to other causes as we shall see later ; that a change or rotation of crops, though it may be in some cases advisable for financial or even forestal reasons, is not a necessity for a successful forestry, as it is in agriculture, and that, if taking place by itself, it is a sign of mismanagement of the original forest.

Finding then that the chemical composition of the soil is not of much importance in forestry, it must be its physical condition which determines a more or less prosperous timber growth. And so we find all observations on the continent at least coincide in this result, that the greatest mass of wood and the most regular growth of timber is yielded by a soil which is deep, sufficiently loose and rich with humus, and which at the same time possesses a degree of humidity proportionate to the wants of the species growing thereon.

To understand the character of a soil it will be necessary to discriminate several strata in the same ; we may call that upper part of the soil which the roots penetrate the surface soil, in opposition to the lower strata or subsoil. These two strata may offer different relative appearances ; they may be similar, *i. e.*, either both difficult to penetrate like rock and clay, or else easily permeable like sand, loam, or disintegrated rock ; they may be of different character, when either may be hard or loose ; the commonest case being a hard subsoil below more easily permeable surface soil, as for instance when clay or rock or bog iron stone exists below sand or loam. Of course, these strata do not generally exist in this marked distinction, but in gradual transition, the looseness decreasing with the depth.

In the subsoil strata the angle of inclination is of importance, as upon it partly depends the capacity of the soil to retain water. We discriminate in regard to water a pervious and impervious soil. Thus plastic clay, undisintegrated rock, or a horizontal or

only slightly inclined layer of subsoil, forms an impervious soil. If the subsoil present a vertical or strongly inclined stratification an unfavourably quick percolation of the water may be the consequence, whilst a horizontal stratification of impervious subsoil may cause detrimental stagnation.

According to the depth of surface soil we discriminate a deep or shallow soil, which properties, however, must be considered relative to the species of tree which is to grow on it; for a soil may be too shallow for oak, which is sufficiently deep for beech and fir.

Depth of soil, *i. e.*, a deep surface soil is especially desirable and important for such species, as, like oak and spruce, form a taproot and which do not attain considerable height if the development of this root is impeded, especially when the lack of depth is not counterbalanced by extra humidity. The stunted growth of a forest will speedily indicate such a locality. Depth of soil favours the growth for the reason that it provides a continual reservoir of moisture. Therefore even those trees with shallow tracing roots prosper best in a deep soil.

The shallowest soil is generally due to plastic clay, the tenacious quality of which prevents the roots from penetrating deeply, consequently it is not fit for Oak *timber* forests. The same disadvantages are caused by bog iron stone, which consisting of a mixture of hydrous protoxide of iron, oxide of manganese, phosphoric acid, sand and organic compounds, forms continuous slabs not far below the surface, presenting an impenetrable barrier to the roots. In the province of Hanover, since its accession to Prussia, large areas of the Luneburg heath have been inforested by breaking up this stone with subsoil plows, and planting pine seedlings in the furrows, thus converting lands so long unprofitable into a source of wealth.

Looseness of soil, when accompanied by sufficient humidity, tends to produce a maximum of fibrous roots, which provide the plants with water and inorganic substances. Consequently the largest yields and especially the greatest height of growths, are to be found on alluvial soil, which from the manner of its formation must be very finely divided. From this cause too results the fertility of the inundation soils of ponds and of the marshes near the sea coasts. The superior growth on the fresh sweating sand is due to its looseness and depth.

Though the looseness of the soil is most conducive to *largest* yields, yet a soil will produce a *good* yield, if it is only sufficiently deep and moist, such as that formed by disentegrated rock.

In regard to *humidity* the different species require a different degree of moisture. Most of the forest trees require only a "fresh" soil (which when pressed leaves traces of moisture in the hand); some species, like the ash, prosper still in "moist" soil (which, when pressed, drop water); and the elder requires even a "wet" soil (which drops water without being pressed.) A dry soil is a favourite with no species, though birch and pine can best exist on it.

Two circumstances determine the degree of moisture in the soil, its character and its position. The soil in valleys, river places, near lakes and seas and on northern exposures contains more humidity than that of the mountain ridges, on eastern and southern exposures. One quantitative determination of this difference is known to the writer, where the accretion of a beech growth, fifty-nine years old, on one of the Hessian mountains was measured, and it was found that the accretion on the southern aspect bore the proportion to that of a dell and to that of a northern aspect as 16 : 39 : 48.

The favourable appearance of tree growth on northern aspects may be considered due to the greater depth of soil generally found in such localities, and this again is due to the fact that the moisture, which promotes and expedites the disentegration of rocks, is not as quickly absorbed there as on other exposures more subject to the drying influence of sun and wind.

The lacking humidity of soil may be compensated by the humidity of the atmosphere, especially for such species as, on account of their dense foliage like the beech, evaporate profusely. This accounts for the excellence of the growth in higher mountainous regions where the atmosphere is generally moister than on lower levels.

Considering that thirty to fifty per cent. is constituted of water, and of the dry substance forming the wood, called cellulose and lignine, forty-seven per cent. is composed of

oxygen and hydrogen in the proportion of water, it is no wonder that the humidity of the soil is of so much importance for timber growth, and its supply may be held as the chief office of the same.

Another factor of the soil has been considered in the light of a plant nourisher, and through its chemical influence favourable to tree growth. This is the *humus*, which forms the covering of all good forest soils, and is produced by the decay of the yearly fallen foliage, twigs, etc., and other decaying vegetable matter, and consists of the combination of neutral salts. The acids which are formed in some humus soils, according to Liebig, are not components of a fertile humus, but belong to that of peaty and marshy soils, which are not favourable to tree growth. Carbon, hydrogen, and oxygen are the main components of humus. It has been asserted that the humus ought to be considered as furnishing the supply of carbon, which forms the largest part in the composition of the woody fibre. For any one who has seen the forests of large extent along the dunes of southern France and the sea sand of the north German plain, lacking all traces of humus, nay, containing so little carbon that after heating it will not leave a trace of black colouring, it needs not to cite Liebig's proof of the insufficiency of the humus or any part of the soil, to provide the amount of carbon necessary for the building up of the tree and a forest. Besides, who could reasonably accept, as logic would compel us, the creation of decayed organic matter previous, and as a condition of following plant life.

Yet that there is a chemical influence of the humus on forest growth cannot be denied. Not only does the decaying vegetable matter develop a considerable amount of ammonia, which imparted to the atmosphere enriches it with the needed nitrogen, but also of carbonic acid, which contributes largely to the disintegration of the rocks and increases the solubility of the carbonate and phosphate of lime. This influence will be readily admitted as important, when we remember that in ten thousand parts of pure water only one part of carbonate of lime is soluble, whilst in the same quantity of water acidulated with carbonic acid, ten parts of that salt will dissolve.

But the greatest significance of the humus lies in its physical influence, which is the more important, where the other factors of "soilbonity," depth, looseness, humidity are lacking. A considerable layer of humus increases depth; as a bad conductor of heat it counteracts the drying effects of the sun, which, added to its capacity of absorbing easily and retaining long the meteoric precipitations, makes it a very desirable covering of the soil. The humus being of medium looseness tends to diminish the extremes of the physical properties of the soil.

We may here sum up the influence of the soil on forest growth by stating that its chemical composition is only of minor importance, almost all soils furnishing sufficient inorganic bases of the description which is needed by forest growth; that its main influence consists in its physical properties, represented by its depth, looseness and, depending on these, the capacity of absorbing and retaining moisture, which properties may be increased or even compensated for by a sufficient layer of humus. The existence of these properties in their highest perfection in due proportion are conducive to the prosperity of any species, yet the necessity of their existence is a relative one with regard to the different species.

Seeing then that the soil, though a contributor, does not form the bulk of those elements which form the fibre of the tree, we must look for another source of supply. By a simple mathematical calculation we find that the 1846 kilo of carbon, which are represented by the yearly accretion of one hectare of pine forest cannot be supplied by the soil. There is then only the atmosphere left as a source of this component as well as of the small quantity of nitrogen required.

We need not go into any proof that the quantity of carbon present in the atmospheric air is sufficient to grow wood on the entire area of our globe, nor need we apprehend any danger from overproduction of carbonic acid to the detriment of vegetation. In short we may conclude, that on the whole we need not apprehend any danger of exhaustion of the sources of food, which our forests require, such as we see possible in our coal mines. But it is incumbent on us to utilize this inexhaustible source of plant food by providing the proper means for its conversion into marketable values, that is, by promoting and directing the growths of forests.

Yet tree-growth as well as all other vegetation is confined in locality. Even the

deepest, freshest, most excellent soil will refuse to support vegetation above the line of eternal snow. That the temperature of the climate generally exerts great influence on all vegetation may be inferred from the observation of the flora of different climates. As the temperature declines from the equator towards the pole and from the sea level towards higher elevation, so we find that the forest growth in both directions shows a less diversified appearance and species, and at last a decline in the number of individuals.

This question of climatic influence on tree-growth becomes of practical interest, when the possibility for existence and prosperity of a tree species under certain climatic conditions is to be ascertained for the purpose of introducing new species, and it becomes necessary to determine whether the thriving of a species depends on the mean yearly, the mean summer or winter temperature, or on the extremes of temperature. The solution of this question is as yet possible only on grounds of observation in regard to the natural distribution of trees, or else must in each individual case be ascertained by experiment.

It is not probable that the mean yearly temperature influences the growth much, as may be inferred from the fact that localities of equal mean yearly temperature show a very different influence on their timber growth.

Whilst in Siberia the willow grows on frozen soil, which thaws for a few summer months, the St. Gothard Mountain, though enjoying a higher mean temperature than the locality referred to in Siberia, is entirely bare of all vegetation. It is rather more probable that the distribution of species depends mainly on the mean temperature of the summer, or better on the length of the time of vegetation. For tender species the line of distribution will no doubt be determined by the lowest extreme of winter temperature, which may cause death by frost. On the contrary extremes of summer heat, if accompanied by sufficient humidity of soil and atmosphere are not opposed to the cultivation of species, which in their natural occurrence belong to northern or elevated localities with lower temperatures.

It may be mentioned here, that the different temperatures of the soil, depending greatly on its colour, may hasten the revival of vegetation in spring and thus expose the young buds to late frosts. In some localities the phenomenon of frosts rendering tree culture hazardous is due to a rapid evaporation of the moisture of the soil as in the dells, and vales, and on heavy, impervious soils where water is collecting and insufficient circulation of air impedes its speedy removal. Plateaus too suffer often from frosts, when plains with the same mean yearly temperature are left intact.

This phenomenon is mainly due to the increased radiation of heat during the night because the thinner strata of air in such plateaus offer less resistance to radiation.

So far we have considered such conditions of forest growth as are in the majority of cases given and often unchangeable; we have to accept them as they exist and try to make the best of them. If our soil is a dry sand we shall not be able in most cases to adapt it to the cultivation of elder or ash; if we live so far north that the period of vegetation is too short for the prospering of the oak, we may as well not attempt its cultivation, and so on. There is little scope for changing the conditions of soil, air, climate, or at least the change can be effected only in an extended period of time and by careful forestry.

But here a condition of forest growth presents itself, which largely, we may say entirely, lies in the hands of the forester; a condition which he is able to create and control, on the understanding of which a successful management of his plantation must be based throughout. In fact we may say that the most important criterion in forestal operations, is formed by the relation of the forest trees towards light and shade. The conditions created by the existence or absence of the proper amount of light, we should characterize as the principal one for the consideration of any manager of forests. We do not mean here to discuss the physiological influence of light on vegetation in general, which shows itself in the decomposition of the carbonic acid of the air, thus furnishing the means of assimilation of the carbon which is necessary for the growth of the plant, its colouring, the ripening of the seed, etc.; but the necessity of providing in the forest a proper amount of light or shade according to the wants of different species in their different ages.

The credit of having drawn the attention of foresters to the importance of this relation of forest trees is due to Dr. G. Heyer, now Professor of Forestry in Munich, the

exposition of whose theory has induced a better comprehension and a modification of existing methods of management.

It is a known fact, that the higher the organization of a plant the more light is needed for its proper growth with few exceptions, such as some cryptogamia and mosses, which require direct light. Most of the mosses prosper with a small amount of light under the shade of trees, and disappear when the forest in its more advanced age grows thinner. The contradiction to this rule presented by the vegetation in mountainous regions is only an apparent one, because there the frequent mists replace the shade of forest trees.

The most highly organised plants exist in that part of the globe, where the sunlight is most intense and the farther we go from the equator towards the poles, the more increases the proportion of cryptogamia to phanerogamia.

Now the quantity of sunlight necessary for the development of the most highly organised plants, the Cotyledons, is very different for difierent species and genera. Many plants of this group can only live in the shade of forest trees, like the Asperula monotropa, and disappear with the removal of the forest. So do the forest trees themselves evince a difference of requirements with regard to light and shade, and on these different requirements are based many important forestal operations.

All forest trees may be classified into three groups, which, however, gradually run into each other, and express the relative position of each species with regard to its need of light or shade. We may call these groups the shade-loving, shade-bearing, and light-needing. Criteria for the classification of the different species into these groups are given in the appearance of the foliage, its greater or lesser density, in the capacity of overshadowed branches and trunks to sustain life and to withstand the shading out by the domineering neighbours, and in the power of young seedlings to prosper in the shade of their mother trees.

In judging of the foliage of a species, such specimens as have grown in the full enjoyment of sunlight, ought not to be chosen as samples, because this full enjoyment of light tends to enlarge the amount of foliage and so to form a denser crown; it is only in the forest that the characteristic appearance of foliage belonging to each species can be discerned.

Those species which form dense crowns, evidently need less light than those with higher foliage, for, as the interior leaves of the former get less light, and yet vegetate, it is evident that they need less for their existence. Yet though some species, like the fir, are so tenacious that for sixty or more years they will preserve life under the dense shade of the overshadowing forest, there is no doubt that all species, after a certain period of life, prosper best and increase in the greatest ratio when in the full enjoyment of light, because light favours the production of a large number of leaves, which in their turn excite greater activity in the processes of life or growth of the plant.

This effect of the sunlight is probably not so much due to its luminous quality as to its temperature, which incites evaporation through the leaves, and with it circulation of the sap.

It is natural that species with a dense foliage *i.e.* with a large leaf area, tend at the same temperature to evaporate more water than those with lighter foliage, and therefore draw more heavily on the moisture of the soil than the latter, or we may say on the same soil, under the same conditions, the trees with light foliage will longer withstand the drying effect of the hot sun, than those with dense foliage. This influence of the sun, inducing increased evaporation, tells, especially in young plants, where the roots are drawing their supply of water from a confined area, and the foliage does not stand in a favourable proportion to that area. In this period of life, it is of the utmost importance to the forester to understand this interrelation of sunlight, foliage, and humidity of soil to shape his operations accordingly.

The writer is as yet not sufficiently conversant with the requirements in that respect of the species, which forms the forests of North America, to be able to attempt the establishment of a scale, denoting the relative capacity of the species to sustain shade or their comparative demand for light.

In Germany, where we have only fifteen or sixteen species, that may be considered worthy of notice in the realm of forestry, Dr. Heyer established the following scale, in which

the first three or four species named, are those that demand in their youth an unprepared soil, shade for their proper developments, the others in their sequence are placed according to their capacity of sustaining shade, the latter absolutely requiring direct light for their development.

The series is :—

Spruce (*Abies pectinata, &c.*)—Fir (*Pinus abies L.*) equivalent to *P. balsamea.*

Beech (*Fagus sylvatica L.*)—Pinus austriaca (*nigricans*). Chestnut (*Castanea vesca*) —Hornbeam (*Carpinus Betulus*).

Ash (*Fraxinus excelsior L*).

Oak (*Quercus robur*), practically only one species in Germany against fourteen in the United States.

Maple (*Acer campestre* and *pseudoplatanus*)—Alder (*Alnus glutinosa* and *incana*).

White Pine (*Pinus strobus*).

Common Pine (*Pinus sylvestris*).

Elm (*Ulmus campestris*).

Birch (*Betula alba*)—Aspen (*Populus tremula*)—Larch (*Larix europaea*). The first three can (in Germany in unprepared forest soil) not be forwarded without the protection of nurse trees. In nurseries, and where the preparation of soil favours a stronger development of the roots, and the capacity of the soil to absorb moisture from the air is heightened, plantations prosper without shade ; so they sometimes succeed in mountainous regions with frequent mists and cloudy sky, yet according to good authorities, nine out of ten plantations fail even there.

The fact, that on a loose and sufficiently "fresh" soil the young growth of these species makes less demand on the shady protection of their nurses than in drier localities, confirms only this theory of the correlation of light, vegetation and humidity of soil.

The hornbeam, ash, and oak, and here we may add the American chestnut, will go to seed under the overshadowing mother trees, but soon the vitality of the young plants will be impaired, and if, with their increasing growth, the supply of light is not granted in proportion they weaken and die. Here again a humid soil will help to sustain life longer, by producing a larger amount of leaves, *i.e.*, increasing the area of evaporation.

The species named towards the end of the list demand at an increasing ratio the influence of direct light for their development, the larch, above all, finding it almost impossible to exist, where it is shut out from a perfect enjoyment of light.

That the American forest trees make in this particular case an exception, nobody will maintain, and there is no doubt, that they can be similarly grouped as to their relation towards light and shade.

May we not here perhaps find a clue to the change of species or rotation, in the agricultural sense of the word, which has been observed in this country? Is it not the human hand which has produced indirectly this change, by destroying the conditions propitious for the one species and favouring those necessary for another by removing the shade of nurses, which the existing species needed for its youthful life, and thus creating a growth of species that are more able to develop under the direct rays of the sun? Has not perhaps the indiscriminate denudation, giving access to the scorching sun and drying winds, reduced the humidity of the soil so far as to exclude the existing species from satisfying its greater demand for moisture?

In changing other conditions of growth too such alternations of species are natural. Removing the valuable timber before the seed was dropped will invariably give preponderance to the quick-growing mostly less valuable kinds, which bear seed every year, and whose light seeds are carried over large distances by winds, insects, etc.

We will not dwell on this theme, which has so unfortunately drawn the attention of the cisatlantic foresters in the wrong direction, and only once more lay stress on the consideration, that no chemical condition but the *physical* conditions of forest-growth are underlying the noted alternation of species ; species, that with regard to climate and soil are

more easily accommodated, such as produce more and easily dispersed seed will conquer the captious ones and those with heavy seed and deeprooting kinds will maintain existence in regions, where continuous droughts would kill the shallow-rooted ones in their youth; species that require a long duration of the vegetation period will recede or be overpowered by the quick growing ones; species of slow growth may be crowded out, when quick growing ones find otherwise favourable conditions. Territories which offer favourable conditions to only one or a few species will present pure forests of one, or nearly one kind only, whilst more diversified conditions will through centuries show a varied appearance of forest; in the end perhaps, however, the shade enduring, longlived, heavy-seeded ones will domineer. In forests, where the shade-loving species, such as beech and spruce, have acquired absolute sovereignty, in consequence of human management (absolute clearing), the light-foliaged and light-seeded kinds will gain ground. In short these appearances and changes are the result of that continuous struggle for existence, which pervades all nature and is modified in many ways by the hand of man.

I know that I have only incompletely and in a general way pointed out some of the more important conditions which underlie the growth of our forests. I have done so without any attempt to exhaust the theme in any particular, but have merely endeavoured to draw your attention to the fact, that the whole science of forestry is built, or in the case of this continent, is to be built, upon a very complicated system of elementary knowledge, which can only be gathered by local observations based on a correct understanding of the physical forces at work.

Though there are many minor and local influences conditioning forest growth, those discussed in the foregoing remarks may be considered as the principal and determining ones. And without tracing step by step the deductions possible from these for a correct management of forests, we confine ourselves to giving in conclusion, in the form of short theses, such rules of management as result from a logical consideration of the foregoing expositions, the observation of which will at least insure a healthful preservation of existing and a successful growth of new plantations.

1. The principal effort of the forester must be to preserve and increase the "soilbonity" as defined in the foregoing paper, since upon it depends the productivity of the forest.

2. The measures to be adopted for this purpose are not much to be sought in direct operations on the soil, but mainly in certain considerations in the selection of species, methods of management, terms of rotation, interlucation, methods of reproduction, and in the general care of the forests.

3. Only such species should form the predominant part of the forest as are able to preserve the "soilbonity." These are the shade-enduring and the evergreen.

4. Where an increase of depth, looseness and humidity is especially needed, it is essential that such species should be cultivated as, through a plentiful fall of leaves, favour formation of humus, and by the density of their crowns keep out the two enemies of humification: sun and wind.

5. If for a length of time one species alone is to be cultivated, it must be one with a dense foliage. Light foliaged ones can only be allowed where Nature has provided in some other way for the conservation of the "soilbonity," because they not only furnish too little material for humification, but impede the latter by giving sun and wind access to the soil, thus drying it up and impoverishing it.

6. Mixed forests afford greater security against damages by wind, fire, frost, snow, diseases, besides yielding a larger amount of wood. In these the predominant species must be one of the shade-loving or enduring, densely-foliaged, which protect the soil. The light-needing, thinly foliaged species are only to be mixed in by single individuals, and not in groups, and must be quicker growing or have an advantage in age or height.

7. Two or more shade-enduring kinds can only be mixed, if they are equally quick growing.

8. In growths which in later years become less dense any underbrush is favourable as protection against sun and wind; the cultivation of such artificially may be advisable from financial considerations, though it may not be justified.

9. The distance of the plants in new plantations ought not to be more than three to four feet, as only thus a sufficient covering of the soil can be effected. Besides the yield

of wood per acre stands in direct proportion to the density of growth, *i. e.*, the number of plants per acre.

10. Of all the methods of management, the timber forest with natural reproduction from seed trees is best calculated to maintain the vigour of the soil, for shade-enduring species, if the cutting is done with necessary prudence, so that the soil is exposed as little as possible. Next to this method comes absolute clearing, with immediate artificial re-seeding or replanting. This is almost the only method advisable for light-foliaged trees.

11. Short terms of rotation remove the protection oftener from the soil; long ones carry the danger of soil impoverishment, owing to the natural thinning out of most species in later stages of growth.

12. For interlucation the principal rule is never to deprive any portion of the soil of the protecting cover of the crowns; it is best to confine the thinning out to the over-shadowed, dying trees.

THE CULTURE AND MANAGEMENT OF OUR NATIVE FORESTS, FOR DEVELOPMENT AS TIMBER OR ORNAMENTAL WOOD.

By H. W. S. Cleveland, Chicago, Ill.

No one can travel through any portion of the States east of the prairie regions, without being impressed by the fact that he is never out of sight of woodland. In fact, the chief cause of the prevailing apathy on the subject of forest planting, arises from the fact of the great abundance of groves and extended forests, which convey the impression, in spite of the assertions of staticians, that there is still enough wood growing to supply the place of that which is removed.

The Duke of Argyle, in the interesting sketch of his trip through the States, published after his return to England, says emphatically that nothing in the aspect of the country surprised and impressed him so much as the great amount of wood still remaining, and everywhere giving beauty and variety to the landscape; but he added that it was everywhere the beauty of the wild-wood, which never bore any evidence of culture or effort to increase its value by artificial development.

"I saw nothing (he says) that could be called fine timber, and no woods which showed any care in thinning, with a view to the production of such timber in the future."

Such a criticisn is not surprising from one who, like most country gentlemen of England, is familiar with the process of forest culture, but it certainly is surprising that, with all our boasted intelligence, we still remain practically insensible to the fact that, while almost every tract of woodland contains a large per centage of such trees as are most valuable for timber, already well advanced in growth, and susceptible, by judicious management, of being developed into proper form and size for use in far less time and at far less cost than would be required for the planting and growth of new forest; yet, if left to themselves, not one tree in a thousand will ever be fit for anything better than fencing stuff or fuel. Vast resources of wealth are lying latent and running to waste in our woodlands, and we stand stupidly unconscious of the fact that its development requires simply the application of the intelligent culture we bestow on all other crops. In many instances, it is true, the native woods have been so long neglected, that they are past redemption, but there are, nevertheless, large areas of continuous forest, and smaller groves and wood-lots in every section of the country, now yielding no revenue, which might, by proper annual thinning, pruning and culture, be developed into timber forests of very great value, while yielding an annual crop of firewood in the process.

Where shall we find, or how shall we create, the men who are competent to the work? To judge from invariable practice, our people seem not only to be ignorant of the first principles of forest culture, but unconscious even of the possibility of its application to the development of our native woods. The fact of such prevailing ignorance rests not alone upon negative evidence. We have positive proof in abundance in the attempts which we often see at the "improvement" of a piece of woodland when it is appropriated as the site of a residence. It is hard to conceive of anything more dismal and forlorn than the average result of the effort to impart a home-like aspect to such a place; the

dwelling, with its "span new" expression, standing in the midst of a multitude of tall poles, with tufts of leaves upon their tops, looking like fowls stripped of their feathers, and the bare ground fretted everywhere with freshly upturned roots, the sole remnants of the wild shrubbery which has been ruthlessly exterminated.

In order to a comprehension of the principles of healthy forest growth, let us consider some of the processes of nature, and learn from them her requirements.

If we plant the seed of a maple, chestnut, linden, oak or ash tree by itself in the open ground in suitable soil, and suffer it to grow without molestation, simply guarding it from injury, we shall find that the first act of the young plant is to send out broad leaves, which serve among other purposes to shade completely the stem, and the ground immediately around it in which the roots are growing. As the tree grows, it preserves a symmetrical shape, the limbs spreading and the trunk increasing in size, in proportion to its height, but always preserving the condition of keeping the trunk and the ground for a considerable distance around it, in the shadow of the foliage till mature age, when the roots have penetrated to such a depth as to be safe from injury, and the trunk is protected by thick layers of cork like bark, which safely guards alike from heat and cold the inner layers and young wood in which the sap is performing its functions.

Such are the conditions to which nature adheres, if not interfered with by accident or design, and such, therefore, we may be sure, are those best adapted to healthy and vigorous growth. The fact that they are continually violated with apparent impunity, serves only to show the wonderful power of nature to supply deficiencies, and adapt herself to circumstances, but in artificial culture, we should aim as nearly as possible to imitate the course she would pursue if unimpeded.

The requirements of nature are of course the same when trees are growing together in a forest, as when they stand singly, but the conditions of growth are so changed that the end is attained by entirely different means.

If we enter a tract of wood land, covered with a hard-wood growth of an average height of thirty or forty feet we find it composed almost exclusively of trees which have run up to a great height in proportion to the spread of their limbs. The largest and oldest of them may have had some lateral branches which are now dead, but the younger growth will consist only of tall, slender stems, without a branch or leaf except near the top. It will be difficult, perhaps impossible, to find a single tree possessing sufficient symmetry of form to be worth transplanting for ornamental use. A little reflection will serve to convince us that this form of growth, so different from that of the single tree in the open ground, is the natural result of the action of the same rules under changed conditions.

When a young wood first springs up on open ground, each tree begins to grow as if it were alone, sending out lateral branches and preserving its just proportion. But whenever these laterals meet and mingle with each other, they shut out the sunlight from all below, and thence forward all lateral growth must cease, and each individual is struggling upward to keep even with its neighbours and secure its share of the sunbeams which are essential to its existence, and which can only be had at the top. It thus becomes forced out of all just proportions in the effort to keep even with its fellows. The conditions of keeping the trunk and roots in the shade, however, are even more rigidly adhered to than in the case of the single tree, growing by itself, for the whole area of the wood is shaded, and, moreover, the trees on the edges of the wood, if not interfered with by men or cattle, will be clothed on the outer side with limbs and foliage clear to the ground, so as to check the free passage of the winds whose drying influence upon the soil is even more active than that of the sun.

If we examine more closely we shall find that nature adapts herself to these changed conditions, and avails herself of whatever advantages they afford.

The single tree when growing by itself sends its roots deep into the ground in search of the moisture which cannot be had near the surface, and thus, when it reaches mature age, it draws its supplies from sources beyond the reach of temporary changes, and, moreover, secures so firm a hold upon the ground that it suffers no injury from the storms that assail it, but fearlessly stretches forth its arms as if to challenge the gale.

In the woods, on the contrary, the surface soil never becomes parched or heated, but maintains an even degree of temperature and moisture in consequence not only of the ex-

clusion of the sun and winds, but of the deep mulching of leaves which annually cover the ground and keep it moist, while, by their decomposition, they form a rich mould comprising all the ingredients of vegetation.

If we dig only a few inches into this mould we find it everywhere permeated by fibrous rootlets emanating from larger roots, which under these circumstances have kept near the surface where they draw nourishment from the rich material there provided. If the single tree in the open ground had tried to live by such means, it would speedily have perished for want of nourishment, or would have been uprooted by the winds as forest trees are liable to be when left alone in a clearing.

In the woods the necessity no longer exists of sending the roots to a great depth either in search of nourishment or for support against storms, and nature always adapts herself to circumstances and attains her ends by the simplest and most economical means.

If we now consider the facts I have stated, which anyone can easily verify for himself, we shall find that all the essential principles of tree culture are comprised within their limits, and by their rational observance we may secure healthy and vigorous trees, and develop at will either such forms as will fit them for timber or for ornamental use.

The five trees I have cited—maple, chestnut, linden, oak and ash—are among the most common and yet the most valuable of our forest trees, and may be taken as representatives and proper illustrations of the facts I am stating. Either of these trees, if growing by itself in proper soil and undisturbed by other than natural influences, will attain, at maturity a height of seventy or eighty feet, with a spread of limb equal in diameter to its height, and a trunk of such massive proportions as leaves no room for apprehension of inability to uphold the wilderness of foliage it has to support. But these same trees, if growing in a wood, will send up a slender stem, straight as an arrow, fifty, sixty, or seventy feet without a limb or a leaf, till it reaches the average height of its fellows, and sends out its tufts of foliage to secure the benefit of every sunbeam it can catch.

We see, therefore, that if we wish to form a beautiful and symmetrical tree, or a grove of such, composed of individual specimens of majestic and graceful proportions, we must allow it free access to sun and air, with full power of expansion on every side. While young, however, the growth will be more vigorous and healthy, and we can develope the desired forms more easily and successfully, by leaving a much greater number of trees than are eventually to remain, and removing from year to year all which are near enough to the final occupants to check or impede their full development.

If, on the other hand, we wish to develop the trunk or bole for use as timber we must plant, or suffer the trees to grow more thickly together, and thus extend its trunk longitudinally by forcing it to ascend in search of the sunlight on which its very existence is dependent. The indigenous growth, however, is always a great deal too thick for successful development. The trees are so crowded that many of them perish in the struggle, and those which survive are drawn up into such spindling proportions that not one in a hundred ever attains the dignity of timber, whereas by proper and reasonable thinning, and judicious culture and pruning of the trees selected for final retention, every acre of woodland might be made to yield an annual crop of fire-wood, and all the while be growing timber, which eventually, in many instances, might be worth more than the land itself; or by a different process of management may be converted into a grove of majestic and graceful, ornamental trees.

The proper performance of this work constitutes the most important part of forest culture, and for want of the knowledge of how it should be done, or from ignorance of the possibility of its application to our native forest, a vast area (in the aggregate) of woodland is running to waste; yielding no revenue and promising nothing better in the future than fire-wood, of which a very large proportion is yet susceptible of redemption and conversion into timber of great value at far less cost of time and labour than would be required for the planting and rearing of new forests, while the very process of development would be yielding an annual income instead of demanding large outlays.

Travel where we may we are never out of sight of forest, and every wood lot is a mine of wealth, waiting only the application of intelligent labour for its development. In almost every tract of woodland may be found more or less of the trees I have named, and in many places also hickory, walnut, butternut, elm, cherry, beech and other valuable

timber trees, mingled with a great variety of those which are worthless, or fit only for fuel. In some cases they are past redemption, having been so long neglected that they have run up into mere thickets of hoop-poles. Young growth may everywhere be found, however, which are in condition to be taken in hand, and in almost all cases the work of thinning and pruning may be entered upon with a certainty of profitable results if wisely and perseveringly conducted.

The work of thinning, as ordinarily conducted in the occasional instances in which on any account it has become desirable, is entrusted to mere labourers, who have no regard for the natural conditions which are essential to healthy growth, and which can not be suddenly changed, without serious injury to the trees that are left.

All the small growth of shrubs, such as hazel, cornel, dogwood, elder, shad-bush, etc., is first grubbed out and destroyed under the general term of "underbrush," and this not only throughout the interior of the wood, but around its outer edges where such shrubbery is apt to spring up in thickets, which serve the very important purpose of preventing the free passage of the wind over the surface soil of the interior, besides adding incalculably to the beauty of the wood, as seen from without by connecting the line of foliage of the trees with that of the sward below, and presenting a living mass of verdure. The trees which are considered most desirable to preserve are then selected, and all the rest at once removed. Finally the leaves are carefully raked from the surface and carried off or burnt.

Sun and wind now have free access to the soil, and it very soon becomes parched and dry. The fine rootlets near the surface, which have heretofore been preserved by the never-failing moisture of the rich mould under its mulching of leaves, are converted into a mass of wiry fibres, no longer capable of conveying nourishment, even if it were within their reach. And while the means of supply are thus reduced, the tall, slender trunk, through which the sap must ascend to the leaves, is now exposed to the free action of the sun and winds. Now I do not presume to say that evaporation can take place through the bark, but the provisions which nature makes to guard the inner vital tissues from the effect of the sun's rays, indicate beyond all question that they are in some way injurious. I have elsewhere shown that in the case of the single tree growing by itself, the trunk is always shaded by the spreading foliage, when suffered to retain its natural form. In the forest the trees shade each other, and thus effect the object by mutual action. But now let me call your attention to another provision of nature which few people observe, but the meaning of which is too obvious to be mistaken. If we examine the bark of an oak, elm, chestnut or maple, of mature age, which has always stood by itself, exposed to the full influence of atmospheric changes, we find it to be of great thickness of very rugged character, and of a cork-like consistency, all of which characteristics make it the best possible non-conductor of heat or cold that can be imagined, under the protection of which the living tissues are safely kept from injury through the burning heat of summer and the intense cold of winter.

Now go into the forest where the trees shade each other, and wind and sun are excluded, and you will find that the bark of the trees is smooth and thin in comparison with that of those in the open ground.

Nature never wastes her energies needlessly, and the trees in the woods do not require the thick coat of those that are exposed. But the effect of suddenly admitting the sun and wind upon them is precisely the same as that of exposing any portion of the human skin which had hertofore been clothed. It is to guard against injury from this source that experienced tree-planters, when removing large trees from the woods, are accustomed to swathe the trunks with ropes of straw, which is a rational process, yet it is by no means uncommon to see the reverse of this action. I have seen during the past winter a great many very large fine trees planted on the best avenues in Chicago, at a cost of certainly not less than fifty dollars each, from the trunks and large limbs of which all the rough bark had been carefully scraped, leaving only a thin, smooth covering over the inner tissues. This is as if a man should prepare for unusual exposure to heat or cold by laying aside all his clothing.

Few persons, even among those whose business is tree culture, have any just conception of the value of thorough mulching, as a means of promoting the health and

vigour of growing trees. In fact, such a mulching of the whole ground as nature provides in the forest by the annual fall of the leaves, may be said to be unknown in artificial culture, so rarely is it practiced, yet its immediate effect in promoting new and vigorous growth is such as would seem almost incredible to one who had not witnessed it, and affords one of the most beautiful illustrations of nature's methods of securing the most important results by such simple and incidental means that they escape our notice, though going on right under our eyes from year to year.

Of course the richest food for plant consumption is in the soil near the surface, but if that soil is subjected to alternations of temperature and moisture, sometimes baked in clods, and at others reduced to the consistency of mire, no roots can survive the changes. In the forest, as I have elsewhere said, these changes are prevented by the shade of the foliage and the mulching of fallen leaves. The rich mould of the surface soil maintains an even temperature, is always moist, and is everywhere permeated with fibrous roots drawing nourishment from the rich sources which surround them, and this process may be artificially imitated, and the same results attained, by mulching, if properly done. It does not suffice to pile a few inches of straw or manure around each tree for a short distance from the trunk. If the tree stands singly, at a distance from others, the mulching should extend on every side beyond the spread of its branches; and in the case of an orchard, or young wood, the surface of the whole area it occupies should be covered with leaves, straw, shavings, chip-dirt, tan-bark, or whatever material is most available, to a depth of several inches. I first learned the value of the process when a young man, on a coffee plantation in Cuba, where a portion of the hands were constantly employed in collecting refuse vegetable matter of all kinds, and spreading over the whole ground between the rows of the coffee bushes, to such a depth as served to keep the surface cool and of even temperature, and also to prevent the growth of grass and weeds, and thus supersede the necessity of ploughing between the rows.

Afterwards, when engaged in fruit culture in New Jersey, I practiced it in my vineyard and orchards with most satisfactory results, of which an account was published more than thirty years ago, in the *Horticulturist*, then edited by A. J. Downing.*

The trees and vines responded at once to my efforts in their behalf by such increased luxuriance of growth that it was easy to distinguish the portions that had been mulched as far as they could be seen, and, on digging into the surface soil under the mulching at any point, I found it filled with fibrous roots precisely as is the case in the leaf mould in the woods. No fruit-grower who has once tried this experiment will ever after forego the advantages it offers, and I have spoken of it thus at length from the obviously vital importance of its bearing on forest culture. A moment's reflection will show that in the opening and thinning of native wood which had grown thickly together, a heavy mulching of such portions of the ground as may unavoidably become exposed, may be of most essential service in preserving the health and vigour of the trees that are to be retained.

It is difficult to lay down specific rules by which a novice could be guided in the work of opening and thinning out the wood of a native forest, except by fully impressing him with the importance of preserving, so far as is possible, the conditions which nature shows to be the most favourable to vigorous growth, and proceeding very cautiously when it becomes necessary to change the relative proportions of the influences which affect the vitality of the trees. The age and condition of the wood at the time the work is begun, are, of course, important elements for consideration. If the growth is not more than ten or fifteen years, and the trees have not sprung up so thickly as already to have become a mere thicket of hoop-poles, but have preserved a reasonable degree of symmetry, its management can be much more easily controlled than if it has attained a more mature age, and especially if the object is to create an ornamental grove composed of fine specimens of individual trees, a process by which the value of desirable residence sites in the vicinity of cities or large towns might often be very greatly increased.

Whether this be the object, or the development of timber, the first thing to be done is to select and place a distinguishing mark upon every tree which is ultimately to be retained. Then remove at first from its immediate vicinity only those which are actually

* *Horticulturist*, Vol. 3, p. 113.

crowding it, or impeding its growth by shading or interfering with its foliage. Those which simply shade the trunk or the ground around it are serving a useful purpose, and should not be disturbed. Indeed, if it is found that the necessary removals involve much increased exposure of the surface soil around the tree, it should at once be covered with a mulching of sufficient depth to prevent the possibility of its becoming heated and dry. All other sources of danger to the health of the trees are insignificant in comparison with that of the rude check they are liable to receive from sudden exposure of the trunks and surface roots to the influence of the sun and wind, from which they have heretofore been protected, and to which they can only become accustomed by a gradual change.

The next year it will be found that the tree has gladly availed itself of the opportunity for expansion, and has spread its limbs to fill the vacant space around it, so that more trees must now be removed, while the increased mass of foliage it has developed renders it less liable to suffer injury from their loss.

The removal of the undergrowth of shrubbery, should be very cautiously conducted, and in no case should it be removed from the outskirts of the wood, which should everywhere be left with as dense a growth as possible, to prevent the entrance of the winds.

The sirocco-like wind from the S. W., which often blows with great violence for days together, especially in the spring and early summer, when the trees are full of sap, and the young shoots and leaves are tender and sensitive, is the one from which most danger is to be apprehended. The merely mechanical injury it inflicts upon the spray and foliage is often serious, but its worst effects are due to its absorption of moisture and vitality.

All experienced nurserymen and fruit-growers, have learned to dread its exhausting influences especially upon grape vines and other broad leaved plants, and they too are aware of the fact, which comparatively few ordinary observers seem to have noticed, that its effect in giving a general trend of the spray and branches of trees in exposed situations toward the N. E., is so marked that no one who has learned to observe it, need ever be long at a loss to know the points of the compass in any parts of the country.

The fact, however, that we have it in our power to guard against the evil effects of this wind by artificial means, is not so generally known as it should be, and it was only after many years observation and experience that I came to a full realization of certain facts in connection with its action, which have a most important bearing upon the question of forest culture.

I became aware, many years since, that many shrubs, trees and plants would grow and thrive at Newport, R. I., and at Yarmouth, Nova Scotia, which in the interior were only found much farther south, and would certainly perish if removed to the latitude of those towns. The reason assigned in both cases was the warming influence of the neighbouring gulf stream, which seemed a plausible explanation in which my faith remained unshaken for years, until I went to Chicago, where I found it was impossible to grow many of the finer fruits, and some of the forest trees which elsewhere are found in much higher latitudes. Neither peaches or grapes can be grown at Chicago, or at any other point on the western side of the lake without artificial protection, and the native growth of wood is very meagre, and many varieties which elsewhere are found much farther north, as the beech and the hemlock cannot be grown ; yet the eastern shore of the lake, only sixty miles distant, has no superior in the whole country as a fruit growing region. Peaches, grapes, strawberries, etc., grow most luxuriantly anywhere on that shore up to the northern extremity of the lake, three hundred miles north of Chicago, and every variety of forest tree indigenous to the country is found in the best condition of vigorous health.

There is no gulf stream to account for this difference, but the relative position towards the lake of the whole extent of its fruitful shore is the same as that of Newport and Nova Scotia towards the ocean. In both cases the S. W. wind reaches the shore after passing for a long distance over water, and instead of burning and exhausting vegetation with a breath of fire, it comes laden with the moisture it has gathered up in its passage, and brings health and strength upon its wings, instead of disease and death. Further reflection served to convince me that the rule was susceptible of much wider application, and serves to explain the different vegetation of the eastern and western shores of great continents in the same parallels of latitude. Central Spain and southern

Italy the lands of the orange and grape are in the same latitude as Boston, and going west on the same parallel to California, we again find ourselves surrounded with fruits and plants which in Boston can only be grown under glass. Continuing our western flight across the Pacific, we find the flora of Eastern Asia to bear, in many respects, a striking resemblance to that of Eastern America.

These facts have certainly a very important bearing upon the question of forest culture. They prove that the S. W. wind of spring and early summer is perhaps the worst enemy we have to guard against, and also that its deleterious influences are neutralized when it passes over a large body of water. It is comparatively rare, however, that a situation can be secured affording that advantage, and the question naturally arises, are there no other means of protection? I am happy to have it in my power again to summon nature as a witness that such means are within our reach.

I have said that the beech would not grow near Chicago, a fact which I was very reluctant to admit on first going there, and was only fully convinced of its truth by witnessing repeated failures, and the evidence of reliable nurserymen who had tried in vain to preserve it. Yet after I had long been satisfied that it was idle to attempt its culture, I was one day amazed, while surveying in the woods a few miles from the city at coming upon a little group of beech trees comprising some twenty or thirty in all, of mature size and in full health and vigour. On examining the situation, to discover, if possible, an explanation of the phenomenon, I observed first that they stood in the bottom of a ravine so deep that their tops were scarcely even with its banks, while the wood which surrounded them extended more than a mile to the S. W., so that they were completely sheltered from the effects of the wind from that quarter. I have never been able to find or to hear of another beech tree anywhere in that region, and can only account for their presence by supposing the seed to have been brought from a distance by birds, probably crows, jays or wild pigeons, and dropped accidentally on the spot, which proved to be a "coigne of vantage," where they were safe from the enemy. The evidence thus afforded of the value of a screen on the S. W. side, should not be lost on those who are selecting sites for orchards, or vineyards, and shows the importance when thinning a wood, of leaving whatever shrubbery or foliage there may be on that side to arrest the progress of the wind.

The work of pruning the trees which are to be preserved for timber involves a careful consideration of the principles I have set forth, apart from the judgment required for the skilful performance of the mere manual labour. The object in view being the development of the bole, it is important to remove any limbs which threaten to become its rivals in size, if any such have become established before the work of improvement began. But after the trunk has attained the desired height, it is on all accounts desirable to develop the largest possible mass of foliage, because the making of wood can only be effected by the elaboration of the sap, which is the work of the leaves.

If one is rearing a new forest, in which the trees have been under his control from the time of planting, it must be the result of his own ignorance or negligence if he has failed to secure such forms as he desired, since it is easy to direct the growth of young trees, and prevent them from running into extravagances, which will unfit them for service as timber. And not unfrequently we may find a young wood of indigenous growth which may be taken in hand and wrought into such shape that its future progress can be easily directed. But, for the most part, in woods that have been suffered to run wild till they have approached maturity, a good deal of skilful pruning will be required to bring the individual trees that are to be preserved into such forms as will give them most value. Nothing but practice and careful observation can confer this power. The little treatise of DesCars on the pruning of forest and ornamental trees, translated by Mr. C. S. Sargent, of the *Arnold Arboretum*, and published by A. Williams & Co. of Boston, (price 75 cents) contains full and explicit illustrated directions for all the manual work of pruning, and is invaluable as a guide to the novice, and a work of reference to experienced foresters. But mere manual skill in the performance of the work will be of little avail without the application of a thorough knowledge of the principles of tree growth, and a strict compliance with the requirements of their nature.

If our agriculturists will but apply to the management of their forests the same in-

telligence with which they direct the culture of other farm crops, they will find an equally ready response to their efforts. The farmer who should leave his field of corn or potatoes to shift for itself, or suffer his cattle and hogs to ramble through it at will, would be justly sneered at by his neighbours and punished by the loss of his crop—and trees have no more capacity for self-management than corn or other vegetables, and are quite as ready to profit by judicious culture, and to yield returns corresponding to the care bestowed upon them. They are not liable to be utterly destroyed, as corn is, by the incursions of live stock, but they do suffer serious injury from the trampling and rooting up of the ground. I have seen beautiful groves of oak in Iowa full of dead and dying trees, and, on asking the cause, have been told that the native woods "can't stand civilization," but always die out when cattle begin to run in them; and I am told that, in Kentucky and elsewhere in the South, the young growth is found to contain only the inferior varieties of oak, as the swine running in the woods seek and greedily eat the acorns of the white oak, on account of their superior sweetness. Has anyone ever estimated the cost of raising hogs on such food?

I have endeavoured in the preceding pages, to confine myself to the special features of forest growth which need to be regarded in the effort to develop and improve a native wood, wherever it may be. The planting and culture of an artificial forest is quite another affair, and I have made no allusion to it because my special object has been, if possible, to urge the fact, and arouse attention to it, that we still have vast resources of latent wealth on every side, susceptible of development by proper management, which we are everywhere suffering to run to waste. The work of planting and rearing artificial forests cannot indeed be urged too strongly, and there is no danger of its being overdone. But the conviction of its necessity can be more readily and forcibly impressed upon the popular mind by an illustration of the possibilities of forest culture, when applied to our native woods, than by any other means. The need of further progress by artificial planting will speedily become obvious, and will follow in natural course.

It has been asserted, and with truth, that it is idle for us to establish schools of forestry, because there is no demand for foresters, and consequently no stimulus to the acquirement of knowledge of the theory and practice of the art. It will be time enough to establish such schools, it is said, when we have evidence that there are people who desire to avail themselves of the advantages they offer, and that will not be till there is a demand for the services of those who have done so. This is true, so far as it goes, but the next consideration is, how to create the demand. There was no demand a few years ago for telegraph operators, and when I was a boy there was no demand for railroad employés, for there were no railroads. How was the demand created? By showing the importance of the results. Think of the time and labour expended by Morse and his associates before they could get permission to demonstrate the value of the electric telegraph by a line from Washington to Baltimore. No general interest was felt in the scheme till its advantages were thus made manifest, because there was no *realizing conviction* of its truth. And to-day we are in a similar position in reference to the question of forestry. The impending danger of the diminishing supply of timber is acknowledged by all who are familiar with the subject, but there is no realizing sense of it in the popular mind, and there is a want of confidence in the practicability of any of the proposed measures of relief. The first and most important thing to do, therefore, is to stimulate popular interest by showing what *can* be done. To create a popular demand of any kind, it is essential first to demonstrate the value of its object. The men who are familiar with forest culture, know, as well as Morse knew the capability of the telegraph, that the wealth of the nation may be enormously increased by the proper development of the native woods already standing, but they can point to no evidence of the truth of their assertion, and the fact that it has not been done is regarded as proof of its impossibility. There is no such thing in the country as an illustrative example of what may be accomplished by timber culture, and very few of our citizens who visit Europe can appreciate the works which have there been achieved. They go abroad to study works of art, with the idea that we have nothing to learn in regard to natural productions, and the comparatively small number who grasp the conception of the grand possibilities of development which our forests offer to the exercise of such artificial culture as may there

be seen, can do no more on their return than express their convictions and urge the importance of acting upon them. This they have done for many years past, but they have not succeeded in arousing such a popular conviction of the necessity as should enforce the action of their representatives to the point of making needful provision. The enormous and costly scale on which the work of planting new forests must be undertaken, in order to be effective, seems to throw a damper upon every effort to bring it to pass.

If every owner of a wood lot could be convinced that its value might be enormously increased by a process which, so far from demanding an outlay, would add to his annual income, it would not be long before farmers would consider it as derogatory to their reputation to leave the forests in the wild condition they now are, as they would to have a field of corn presenting a similar appearance of slovenliness. To produce such conviction the truth must be demonstrated in actual practice, and the cost of such demonstration will be but a trifling price to pay for the returns it will bring. Let any State or city select a tract of woodland at some easily accessible point, and put it under a proper course of management, as an experimental forest, and it would very soon excite an interest which could not fail to increase. A portion of it should be suffered to remain in its original unimproved condition. Another part should be improved as "open park," for the best development of individual trees in their fullest natural capacity of dignity and grace, and a third portion should be devoted to the production of timber by the process of thinning, pruning and proper culture. The progress of development could then be seen and watched from year to year in all its stages, and the demonstration thus afforded would touch the interest of every owner of a wood lot. The process would soon begin to be imitated, a conviction of the value and importance of a knowledge of forestry would become established in the popular mind, and the demand for the services of those who had acquired it would lead to a demand for the means of acquirement, and thus the schools of forestry would be called into existence by the natural course of events.

The inauguration of such an experimental or illustrative forest as a means of exciting public interest is surely an object that is well worthy the consideration of legislative and municipal bodies, or of corporations whose interests are connected with this form of national wealth. The cost would be insignificant in comparison with that of planting and maintaining new forests, and the spur of personal interest would incite such general action as would add incalculably to the wealth of every State without further outlay than the cost of demonstration.

It is of course desirable that the experimental forest should be as conspicuous and easily accessible to the public as possible, for which reason the vicinity of a city would seem the most appropriate point. And municipal bodies would be justified in making a liberal appropriation for the promotion of such an object, since it would certainly constitute, for great numbers of people, one of the principal attractions of the city. The beneficial results which would follow, however, would add so largely to the substantial wealth and power of the State that its main support should be derived from legislative rather than municipal action.

It is not, however, my province to discuss the means of effecting the work, beyond this general suggestion.

I have aimed only to convey a conception of the rich resources which nature has placed at our disposal, if we choose to avail ourselves of her offer.

I have made no statement in regard to forest growth which will not be recognized as true by all who are familiar with the subject, and all such persons will endorse my statement that, *practically*, the rules which govern the process are universally ignored.

I have pointed out what I conceive to be the readiest means of awakening public attention and creating such general interest as will insure reform, and I leave to other hands the task of arranging the laws which must govern its execution.

By way of illustrating what has been done in re-clothing a denuded district the wonderful results obtained on Cape Cod are worthy of special attention.

EXPERIMENTS IN TREE PLANTING ON CAPE COD.

By Joseph S. Fay, Wood's Holl, Mass.

The soil of Cape Cod is simply and purely *diluvian* or drift, and at best a light sandy loam, with little or no clay anywhere. Yet it has been, no doubt, well-wooded with oak, hickory and pine in the time past, and has now its fair proportion of forest. Formerly this has afforded some ship timber, but of late it has been mainly utilized for fuel, and when cut off for this purpose, the trees have grown up again, to be again cut off at regular periods. Of course, from this there can be no production of timber or lumber. Until the last forty years the keeping of sheep has been inimical to fresh forest growth, but since then that industry has been almost entirely abandoned, and attention has been given to using some of the vacant lands for tree-planting. This has for the most part been done with the seed of the native pitch pine *(pinus rigida)* and seemed for a time to be quite a success. Unfortunately, in addition to the disasters incident to forest fires, carelessly or wantonly set, this pine has become subject to a blight, said to be a fungus, which attacks the foliage of the young growth, spreading and destroying the trees, so that the hopes of the planter have been grievously disappointed. This has been the case also on the island of Nantucket. Experiments have been made quite extensively, within the last twenty years at Wood's Holl, the south-west extremity of the Cape, with the Scotch pine planted from seed on an old worn-out pasture land. So far, the promise is very good, as the blight or fungus which is destroying the pitch pine does not seem to touch it. The tree, so far, appears to be a rapid and healthy grower, but, of course, its value for timber or lumber cannot be fixed for some years yet. It bears a severe exposure, but more trees are broken off by gales of wind than among our native pines, although this may be accidental or exceptional. The native pine seeds have usually been planted by dropping them in light furrows, run six, eight or ten feet apart, according to the supply of seed. If coming up too thickly, the surplus may be transplanted or cut out. They, as well as the Scotch pine, are also sometimes sown broadcast and do well. If done when there is a light snow on the ground in the spring, there is less likelihood of their being sown too thickly. The white pine will not do well where it is likely to be reached by the winds blowing from the sea, as the salt affects the foliage injuriously. Experiments have been begun with the red pine *(pinus resinosa)* which is a desirable tree for any part of the country. Is is very handsome, and is a fair substitute for the southern yellow pine. It deserves attention. The European larch and Scotch birch have been somewhat planted and are doing well. They are hardy and rapid growers. The former are now planted from seedlings obtained at the west. The earlier ones came from England. The latter came from abroad, and are already quite large trees. The Catalpa seems to have done well, and there are some handsome well-grown specimens introduced from the seed some forty years ago, which encourage the more extensive plantings now beginning to be made. From present appearances there seems to be nothing that will reward labour and capital, better than the systematic cultivation of trees on the light lands of this region, the more so as they are of little value for any other purpose. Attention is being more and more given to it.

The economic results obtained in Scotland from forest planting are forcibly presented in the following extract from a paper read by Prof. Wm. Brown, of Guelph, at the Cincinnati meeting:

In Scotland, especially, the re-clothing has been very extensive and successful. Land that fetched only 8d. an acre for sheep grazing, or 1s. for a deer forest, has been under skill and capital, brought to produce a clear annual revenue of fifteen times these amounts —by tree crops.

Beginning in 1855 I planted annually, on an average, for fourteen years, one and a half million larch and Scotch pine, among the heather and granite of Banff and Aberdeenshire.

Our process was simply to enclose with wire fence from three hundred to one thousand acres, in districts where direct shelter, ornament and climatic amelioration, with the best chances of economic results were necessary and most likely to be secured. Drainage was thoroughly done where required. Planting carried out by day labour, never by contract, under skilled foremen, one man, under average conditions as to soil and size of plants, *notching* as many as one thousand a day. Trees were sized according to height and exposure of the ground, and not less than three thousand per acre—aiming at four feet apart all over. Pitting was necessary only with the larger hard and Scotch pine, or with hardwoods. We always had the best success with small plants, seedlings, with conifera on the exposed parts, and not more than two years transplanted in any case.

Thus the Highlands of Scotland are to-day in possession of many thousands of acres, producing handsome revenue that twenty years ago made a poor show on the rent rolls; average cost, £3 10s. per acre.

The importance of establishing schools for scientific and practical instruction in forestry was set forth in a valuable paper read by Gen. C. C. Andrews, at the Cincinnati meeting.

He first stated facts showing the influence of forestry products on the industrial welfare of the country, and the rapid, and in some cases, wasteful consumption of these products without corresponding means for their re-growth. The prosperity of many trades and of vast numbers of artisans depends on the supply of forest products. A school for scientific and practical instruction in forestry would train men for forest management, and would exert an influence favourable to an improved forest economy. There were more than thirty schools of forestry in Europe, and they had proved highly beneficial. One had just been established in British India. There was not one such school in the United States. This country could not afford to be behind the rest of the world in such a matter. The countries of Europe had experienced forest spoliation like what is now occurring in America, and for many years had been trying to repair the evil. One of their helps was the school of forestry. The public forests of Germany and of some other countries now yield a net income of 4 per cent.

The United States are deeply concerned in the question. The way in which the public timber lands had been for the last half century and were still being squandered was a discredit to the administrative character of the country. Where separate States for their school lands or railroad companies for granted lands are getting $30 an acre for timber lands, the United States are either being defrauded of theirs, giving them away, or, at most, getting only $1.25 to $2.50 per acre. The influence of a School of Forestry would help to educate public sentiment up to a more conservative care of the public timber lands; and the United States could as properly grant public land to endow one School of Forestry as they did twenty or thirty years ago to endow thirty or forty Agricultural Colleges.

The first line of telegraph was put in operation by the Government of the United States. It had, in many instances, lent a helping hand to science. While higher education should, as a rule, depend on private support, there were cases where the Government could probably give an enterprise a start, especially where the interests were national, as in the case of forestry, and affected the mechanic arts as largely.

Besides the Government selling timber lands for a totally inadequate price, the report of the Commissioner of the General Land Office showed that, in spite of a large force of detectives, assisted by United States Attorneys and Marshals, at much expense, $100,000 worth of Government timber was annually stolen and carried away.

Assuming that a school of forestry, with a man of acknowledged attainments in science like an Agassiz at the head of it, would promote an improved forest economy, then it seemed clearly the interest and duty of the Government to take the initiative in the matter.

Some of the inducements which might be held out to the owners of land to encourage the planting of trees are suggested by Mr. Renick.

ENCOURAGEMENT OF TREE PLANTING BY-LAW.

By Harness Renick, Circleville, Ohio.

If it is the purpose of the Forestry Convention to solve the question as to the best plan to arrest, as far as possible, the now rapid destruction of timber, and to induce and encourage tree culture, the undersigned, after a long experience and much study of this most important subject, which should engage the attention of every one desiring the best future interests of the whole country, begs leave to say, that in his opinion there is but one practical way to obtain the much desired end, and that is to enlist the pockets of land-holders by *law suasion;* other kinds of suasion have for thirty years past been tried and failed to effect any good in old Pickaway County; and as the sentiment of the community in any one section is pretty much the same as in another, so that suasion other than the pocket, or present self-interest of the land-holder, will *assuredly fail* wherever tried.

The average land-owner is not at all inclined to preserve his timber for the good of posterity. He rather aims to get all immediate, or near prospective profits from his domains in the shortest possible time. He has heretofore, and will in the future continue to cut off his timber just as soon as he believes it will be profitable to do it. Our forefathers destroyed all the timber from necessity, but unfortunately their descendants of this day seem to have inherited a propensity to continue it, even in many cases when it pays them no profit.

To effectually induce timber preservation in some measure, and tree-planting, the States should offer a liberal and sufficient bounty, or an equivalent in tax exemption on all lands planted and cultivated in trees, and also on at least four additional acres to one planted, until the trees were cut off. To exempt from tax only the planted acres would be next to no inducement to plant. And also exempt from tax all woodlands upon which three-fourths or more of the original large trees were standing, and in addition on four other acres to one of the timber lot. And also exempt partially cleared timber lots whereon there remained one-fourth or more of the original large growth.

The lands devoted to tree culture under tax exemption law would generally be of the thinnest and most exhausted soils, of low value, and to exempt five acres to one planted would prove no great encouragement to the comparatively few who would engage in it.

If it is not constitutional in Ohio to enact a bounty or tax exemption law, then, we should educate voters to favour an amendment of it.

The different varieties of trees believed to be suitable or found so by actual experience for planting in various parts of the country and the practical uses to which they are applied are set forth in the papers which follow :—

THE GROWTH OF BLACK WALNUT IN ONTARIO.

By Thos. Beall, Lindsay, Ont.

Some two or three years ago the persons who foresaw the coming scarcity of forest timber in this country, and who had the courage to publicly express their opinion on the subject, were denounced as alarmists, because almost every one believed our timber resources to be nearly, if not quite, inexhaustible. The stern events of the past decade have, however, shown that the fears of the so-called alarmists are already being realized. Immense forests of pine, hemlock, cedar, tamarac, and other varieties of timber then existing have entirely disappeared through the agency of the lumberman. For what he would have left as a reserve for future use, has, in many cases, been destroyed by forest fires. Many of our thinking people now see that the time has arrived when every effort should be exerted, not only to stay the ruthless demolition of our existing timber, but to commence planting trees for the use of our immediate posterity.

As it is now generally conceded that the public domain will, at the present rate of consumption, be entirely denuded of its timber before the end of the present century, perhaps one of the best means to awaken general public interest on the subject will be to endeavour to show that, for those persons who are seeking permanent investment for surplus capital, forest tree planting can be prosecuted with as great, or possibly a greater probability of financial success than attends almost any other sound commercial enterprise.

Judging from our present knowledge of the commercial value of the various kinds of timber best adapted to the climate, and much of the soil of Canada, the cultivation of the Black Walnut offers greater promise for a profitable investment in this industry than, perhaps, any other kind. Notwithstanding the opinion which so generally prevails that the Black Walnut is not sufficiently hardy to withstand the extremes of our climate, recent experience has taught us that it can be successfully and easily grown throughout the greater part of the Provinces of Ontario and Quebec, and, probably also of Nova Scotia and New Brunswick, where an alluvial, or a deep, rich, loamy, clay soil can be found. Late spring and early autumn frost does not injure the Black Walnut as it does some other varieties of our forest trees. I have known a late spring frost to destroy nearly every leaf on a row of these trees, and in two weeks after the trees were clothed with a new foliage. The blossom buds, however, were destroyed, consequently no fruit was produced that season.

I have never observed the foliage to be injured by any insect enemy excepting the red-hump caterpillar—notodonta concinna—and only occasionally by it, and this tree does not suffer by the loss of its foliage as many other kinds do. Some four or five years ago, at about this time of the year, one of my Black Walnut trees was completely stripped of its leaves by this caterpillar, and to my surprise, the tree reclothed itself with new foliage before the end of the season so completely that no difference could be observed in its general appearance from others standing near it that had not been injured. The following season this tree appeared to be as healthy as any other.

Severe pruning does not perceptibly injure young walnut trees, and if an accident should happen to one whereby it would be permanently disfigured, standing where it might be desirable to have a perfect specimen, I would advise cutting it down to within a few inches of the ground as early in the spring of the year as possible, and allow the stump to throw out a new shoot from out of its many latent buds in the remaining part of its trunk, and obtain a new tree in this way rather than replace it by another. A few years ago I treated several trees in this way that were about two inches in diameter. In three years from that time these trees were really beautiful specimens, standing from ten to sixteen feet in height.

No amount of heat or cold seem to affect the Black Walnut injuriously. During the summer of 1881 the thermometer on my grounds registered over 90° several times, and on two or three days over 100°, and on one day in January last between 35° and 36° below zero was registered. Yet the trees this season present their usual healthy appearance, and are bearing a fair quantity of nuts.

Several persons in the neighborhood in which I reside have lately commenced to plant walnut trees, nearly all of whom are succeeding fairly well, and when a few nuts have been planted in soil suited to their requirements, fine, healthy, and well-developed trees have been the result. Many trees, however, have been transplanted in hard, dry, gravelly, clay soils, and are not flourishing as the owners thereof expected them to do.

Seeing, therefore, that the Black Walnut, although indigenous to only a very small portion of the extreme southerly part of Ontario, has proven to be sufficiently hardy to withstand the extremes of climate peculiar to the Provinces of both Ontario and Quebec; that vast areas exist in those Provinces where the soil is quite suited to produce its healthy and rapid development; that the peculiarities of its habit to produce new foliage when anything occurs to destroy that already produced, and to produce a new growth of wood from near the root in cases of accidents to the tops of young trees; that the rapidity of its growth equals that of any other tree grown in this country; that its timber equals any other in value, and that the cash value of well-developed timber which may be grown on a given area, is so much greater than any other, I would urge that its cultivation under proper management may reasonably be regarded as the most remunerative employment in connection with the cultivation of the soil.

Dr. John A. Warder said that the walnut grew rapidly during the first years of its growth, but grew much slower after it had attained a certain age. Under favourable circumstances a walnut tree of fifty years growth will measure across the stump twenty-four inches, but if it were brought into the market at that age it was found to be very unsaleable, useful only for plain work, for chair legs and trifling things of that kind. Its chief character was its great value and great beauty which it gets only in centuries. He recommended the planting of walnut trees, with trees of some variety which came to maturity earlier at the same time, so that some return could be had from the land at once. Although nothing would grow under the branches of the walnut, they might grow up together.

THE EUROPEAN LARCH—*Larix Europea.*

By David Nicol, Cataraqui, Ontario.

There are three other species of this tree; one is a native of America, one of Siberia, and one of China.

Between the European and American larches there is so little difference in their characteristics when young that they can hardly be distinguished as two different species, though in their growth and quality of their woods there is a remarkable difference.

In the American, Larix pendula (Black Larch, Tamarac), the branches are stronger, the bark more inclining to yellow, the scars more slender and clustered, the leaves are more slender, narrower and more glaucous, and the outer ones of each bundle shorter; cones only one-third the size, blunt, with scales scarcely exceeding twelve in number, thinned, more shining, retuse, emarginate, wings of the seeds straight, more oblong, narrower and, together with the seed itself, of a more diluted gray colour.

The European Larch is a quick growing tree, which rises to the height of sixty feet. The branches are slender and generally drooping, the bark of an ash gray colour, the leaves a little wider, bright green, all nearly equal, commonly more than forty in a bundle. The male flowers appear in the month of April in the form of small purple cones; afterwards the female flowers are collected into egg-shaped, obtuse cones, which in some have bright purple tops, but in others are white. This difference is accidental, for seeds taken from either will produce both sorts. The cones are one and one-half inches long, with over thirty woody, striated, rounded entire scales; under each scale is lodged a brownish gray seed, with two subtriangular wings somewhat bent in; tree generally grows perfectly straight.

No tree better deserves our attention than the larch, for it is one of the most valuable, which brings to the planter the quickest returns, with the most certain profitable results.

It possesses many valuable qualities, succeeds in almost every climate, thrives well on poor land, and is certainly destined to become a blessing to the nations that adopt it.

In countries where it is plentiful, its wood is preferred to all kinds of pine for almost all purposes; for shipmasts, yards, booms, and gaffs, nothing excels it, and in Europe it is extensively used in shipbuilding; for door and window-frames it is well adapted because it does not shrink or warp. Joists and rafters made of it support an almost incredible weight, for it is exceedingly strong. Under water it becomes almost petrified and lasts for centuries. In Venice the piles on which many of the houses were built many hundred years ago, are said to be as fresh as when first put in; for canal lock gates, no wood is equal to it. The wood varies in colour according to age—that of the young trees is nearly white; as the trees grow older the wood becomes red, and is much used in Switzerland for furniture making. Shingles made of it are more durable than cedar or pine, the resin which it contains is hardened by the air and becomes a smooth shining varnish which renders them impenetrable to moisture. For ornaments or farm fences, hurdles and gates, it is particularly suitable, because they can be made lighter and more durable than of any other kind of wood. In Italy it is used for carriage building, for wainscoting, panelling, and flooring. No wood takes paint better. It resists the bore-worm, and wherever strength and durability are required, larch timber is admirably adapted. A valuable product of the larch is Venice turpentine, which exudes spontaneously from the bark, but is more

commonly obtained by boring a hole in the tree and inserting a pipe; this turpentine has always been considered useful in chronic rheumatism and paralysis, gravel-complaints, scurvy and pulmonic disorders.

The larch, when allowed plenty of room, makes a very handsome ornamental tree; its grand habit, with bright green foliage and purple flowers makes it exceedingly beautiful. Placed on lawns surrounding the country villa it has a remarkably fine effect; being perfectly hardy it is never injured by severe weather.

PROPAGATION AND CULTURE.

Though the cones are at their full size in autumn, they are not quite ripe until the beginning of winter, which is the best time to gather them. The seeds in their cones will remain good for years, yet out of their cones they lose their vegetating quality in a few months, therefore, as soon as they are out of the cones, they should be mixed with dry sand and kept in bags or boxes until the season for sowing, which is as early in spring as the ground will permit; when the cones are exposed to the sun a few days the seeds are easily threshed out. They should be sown in finely made beds of sandy loam, and covered with nearly half an inch of fine compost mixed with sand. If kept moist by gentle watering, they will begin to appear in four or five weeks; they must be partially shaded, because when newly up they are very tender, and a few hours of the full sun would completely destroy them. The following spring they should be pricked out four or five inches apart in bed or in rows; in the succeeding spring they should again be transplanted at wider distances, in rows three feet apart and fifteen inches apart in the row, and allowed to remain two years, by which time they will be four to six feet high, and of the proper size to transplant in exposed situations.

In favourable situations, when they are well protected, they do better when planted of smaller size, say three years from the seed, they start more freely and make more rapid progress. Experienced planters have long ago decided that the larch should be planted entirely by itself, because of its quick growth it soon outgrows all other trees, and when scattered thinly throughout the forest, the tender top shoots are apt to be damaged by high winds; they do best when planted thickly because they shelter one another; they are often planted as near as three feet and some times as near as two feet, but I would prefer the former distance; planted at this distance they rapidly shoot up straight, clean, and healthy. At three feet apart an acre contains about 4,900; in this state they should be allowed to remain six or seven years, when they will have attained the height of twenty feet, if they have been well cultivated the first three or four years, they should then be thinned for the first time by taking out every alternate row, the thinnings make the best quality of hop-poles, worth at present about five cents apiece—2,450 poles at five cents brings $122.50. Then being allowed to remain in this state about three years longer, they should have the second thinning. By taking out every alternate tree in the row, this would leave them six feet apart each way; the thinnings are now five to six inches through, and are worth ten cents apiece for boat masts and yards, supports in mines, etc.—1,225 spars at ten cents brings $122.50. After growing five years at this distance they should be finally thinned out to twelve feet apart; the trees will now be seven to ten inches through and over thirty feet high, can be sawed into rafters, fencing, flooring, etc., and are worth at least twenty-five cents apiece—612 spars at twenty-five cents brings $153. Now, if we suppose that the sale of poles and spars would be sufficient te defray the expenses of making and upholding the plantation, and that each tree still remaining on an acre, say fifteen years after planting, is worth only twenty-five cents, the value of 612 trees is $153, there would be a handsome profit after allowing $2 a year for rent, which for fifteen years would be $30, and a great deal of land suitable for growing the larch would not rent for more than half that amount. Now the expenses cease, because the forest can be pastured with sheep without danger of injury to the trees; the increase in value is now much more rapid, the annual increase of the circumference of the trees will average one and one-half inches until they nearly reach maturity, which is in about fifty years after planting. The trees will then average thirty to forty inches in diameter, three feet from the butt. Each tree will produce about 450 feet of lumber at $25 per

1,000, $11.25, less expenses for drawing and sawing $2.25. It would surely not be considered extravagant to value each tree at $9—612 trees at $9, $5,508, less thirty-five years rent at $2 per acre, $70 from $5,508 leaves a net profit of $5,438. Be it observed that plantations of larch do not impoverish the land, but rather improve it. The annual deposit of leaves gives more nutriment to the soil than is taken from it by the trees.

Larch in its green state is almost incombustible, so there would be but little danger of destruction by fire, and there would be none if the dead branches were taken away.

A man would have to begin planting when young in order to realize the profits of a plantation, but he can, by planting soon, add much to the value of his estate and the investment would probably be as safe as in bank stock. The price of lumber now is more than twice what it was fifty years ago, and there is every reason to believe that it will double in price before another fifty years has gone.

There are thousands of acres of land in Canada and in the United States which cannot be converted into arable land—an acre of which would give but poor summer maintenance for a goat—if judiciously planted with larch would soon become the most valuable lands in the state, and would add immensely to the wealth of the nation.

THE WHITE ASH.—(*Fraxinus Americana.*)

By Arthur Bryant, Princeton, Ill.

Of the six species east of the Rocky Mountains, the white ash is the most useful for all purposes where strength, lightness and elasticity are required, as notably in the manufacture of agricultural implements. When this tree grows rapidly, as in favourable soil and climate, it affords the best timber, but where it is stunted in growth, as in Southern Russia, it is of a weak and brittle texture. In planting the ash with a view to the production of timber, the trees should be grown thickly while young, in order that they may take a clean, straight stem. When of proper size the trees may be taken from the seed bed and planted in rows four feet apart and two feet apart in the rows. They may be easily transplanted, after which they should be kept well pruned of side branches up to near the top. From three to four hundred trees are probably as many as can be grown to maturity upon an acre. The blue ash is rarely found east of the Alleghanies. It sometimes reaches the height of seventy feet or more, and is distinguished from other species by the quadrangular shape of the young shoots. The bark on old trees is not furrowed like that of the white ash. The black ash is usually found in wetter soils than the other species, whence it is often called swamp ash, or water ash. The wood is very elastic and divides easily into thin strips, which are used for coarse basket work, and for the hoops of barrels, for which latter purpose it is the most economical wood that can be procured. The red ash is common in Pennsylvania and Virginia, and possesses similar qualities to the white ash. The green ash is a small tree, seldom reaching middle size. It is found on the banks of rivers, and is more common in the Western than in the Eastern States. The properties of the wood are similar to those of the white ash. There is another variety called the Carolina water ash, found in the swamps of the Southern States, which has no very special merits.

THE RUSSIAN MULBERRY.

By D. C. Burson, Topeka, Kansas.

The American people, as a nation, have a pre-disposition for quick returns, no matter in what branch of industry or business it may be ; consequently it sounds too much of the dim distant to talk of planting forests for the benefit of "nations yet unborn." But if we can picture groves of beauty and use, bringing dollars and cents to the present generation, they will grasp it at once. Consequently it is our duty to urge the planting of quick growing, hardy, useful trees. And such a tree is now coming into great notoriety on our western prairies. I refer to the "Russian Mulberry." It was first brought to

this country by Menonites from Western Russia, and as near as I can learn through E. H. Rondebush, of Topeka, who got a quantity of the seed direct from Russia last season, it is a cross between the Morus nigra, or black Mulberry of Persia, and the Morus Tartarica, a native Russian variety. It is a rapid grower, and stands transplanting almost equal to the cotton wood, but its great superiority over the cotton wood is that its timber is valuable, the tree ornamental, and the fruit useful. The timber is used in the manufacturing of cabinet-ware, and for durability as a fence post it is not surpassed even by the Catalpa, or Red Cedar. It commences bearing at two years old, and is very productive. The fruit, which is about the size of blackberries, has a sub-acid, sweet taste, and is used for dessert; it also makes a pleasant light wine, and the leaves are largely used for silk worm food. As to the rapidity of its growth, trees, the seed of which were planted seven years ago, are now 25 feet in height, and from six to eight inches in diameter. They grow to be very large, often sixty feet high, and from three to four feet in diameter. So, I firmly believe, that after taking into consideration the certainty of growing when transplanted, the rapidity with which it grows, the value of the timber when young, the usefulness of the fruit for the table, and the leaves for silk worms, we have no tree of more value—the Catalpa excepted—for our Western prairies, both for present and future generations, than the Russian Mulberry.

THE POPLAR FAMILY.

By Prof. Sereno Watson.

The genus *Populus* stands at the head of all our deciduous trees in one respect. It is the only one that ranges over our whole area, from the Atlantic to the Pacific, and from the Gulf and the Mexican boundary to British America. The willows, alders and birches extend across the continent—but only as shrubs between the Mississippi and the Sierra Nevada. The oaks and buttonwoods also reach the Pacific, but only through the southern tier of territories. There is not a state or territory in which some one or more of the species of *Populus* may not be found at home, and attaining the dimensions of a respectable tree. This fact speaks for itself, and need not be dwelt upon.

Unlike the much larger genus *Salix*, the members of which are all popularly known only as "Willows." the kindred genus *Populus* is as generally divided into three groups, the "aspens," the "cottonwoods," and the "poplars." This division has, in fact, a scientific basis, and in the consideration of our subject, we cannot do better that to accept this grouping. All are characterized by a resemblance to the willows, to a greater or less degree, in their fondness for water; the readiness with which they are propagated by cuttings, the rapidity of their growth, and the light and soft quality of the wood.

The aspens have smooth or smoothish bark, an ovate leaf with a flattened stem, which causes its perpetual quivering motion in the wind, and a narrow seed-pod and minute seed. They also are the least in size, rarely exceeding a height of fifty feet. We have two species, the "Quaking Asp" (*Populus tremuloides*), and the "Large-toothed Aspen" (*P. grandidentata*). A third species, (*P. heterophylla*), also technically belongs here, though it has rougher bark, a round leaf-stalk, and becomes a somewhat larger tree. The two latter are confined to the Atlantic region, from the Alleghanies and western New England to the Mississippi. The Quaking Asp, on the other hand, is of very wide range, extending from the Arctic zone to all our northern States, to New Mexico, Nevada, and California. In the western mountains it is found reaching an altitude of 10,000 feet or more. It is peculiar in its habits, growing usually in dense groves in moist valleys or on mountain slopes, to the exclusion of everything else, the straight, smooth, slender trunks very uniform in size, though never large. In the newer territories its long, straight poles are sought for fencing, and notwithstanding the general poor repute of the wood of this genus for out-door uses, they are said to be more durable than pine.

The cottonwoods are larger trees, with rough cracked bark, the triangular leaves with a scalloped margin and flattened stalks, and the much broader pods with larger seeds. Their range is southern, scarcely passing to the north of lat. 42°. The species as

at present recognized are two, the "Necklace Cottonwood" (*Populus monilifera*), and "Fremont's Cottonwood" (*P. Fremonti*). The first is eastern, probably not reaching the Rocky Mountains; the other extends, in two or three varieties (which may possibly be distinct), from California through Nevada, Arizona, Utah, and New Mexico, to Colorado. They are found upon the borders of streams, and not to any great altitude in the mountains.

The poplars, finally, are still larger trees, with thick and deeply cracked bark, the heart-shaped or lance-shaped leaves, on round foot-stalks and slightly toothed, the pods and seeds large, and the buds copiously coated with resin. These are northern trees, and we have three species. The Balsam Poplar (*Populus balsamifera*), ranging from our northern States to Colorado and Montana and northward. The Narrow-leaved Poplar (*P. angustifolia*) in the Rocky Mountain region, and the Hairy-fruited Poplar (*P. trichocarpa*) in the Pacific ranges, from California to British Columbia.

We have here, therefore, a family of trees, which, in its several members, is adapted by nature to almost every extreme, whether of latitude, longtitude or altitude, that our country affords. Taking this in connection with the extreme ease of their propagation, and the usual rapidity of their growth, and we have the main reasons for considering these species as the surest, readiest, and often the only resource in forest culture over large portions of our territory.

Though in general found in the neighbourhood of water, yet this is not essential, as they will grow with vigour wherever there is a damp substratum within reach, and wherever any other tree will live. Nor is a rich soil needed for them. On the high treeless plateaus of Washington Territory bordering upon Idaho, a growth of aspens often springs up voluntarily when provision is made against the usual autumn fires, and the poplar is the tree that is planted in taking advantage of the territorial laws favouring tree culture. In Utah, upon the dry slopes bordering the desert, the Mormon colonists plant the cottonwood and poplar with success. And on the wind-swept plains of Kansas, I am told that in the shelter of a mere furrow turned up across the prairie, there will soon spring up a line of young cottonwoods marking its track.

And, moreover, for their economic uses these trees are not to be despised. They afford a very fair fencing material, considering its quickness of growth, and therefore ready replacement. They afford a good quality of fuel, burning freely and giving a strong steady heat without smoke or snapping. The quality of the wood varies to some degree in different species, but in general the lumber which they furnish, though not suited for exposure to the weather, is well adapted to indoor uses, enduring and sufficiently strong. It works well under the plane, and from its lightness, softness, and fine even grain is excellently suited for many minor purposes. The use of the wood in the manufacture of paper-pulp is well known.

Again, for ornamental purposes the value of this family is not duly appreciated. Some varieties have long been cultivated here and in Europe, but there are others which are more worthy of it. None of the western species have, I believe, been planted at the east. They differ considerably in their habit of growth, but all in their place are handsome trees, and deserve a more general introduction. No more noble tree is grown by us than the true Balsam Poplar, as it is seen in the mountains of Montana, with its straight, clear, massive trunk, gray and deeply furrowed, and a hundred or a hundred and fifty feet high.

The objection that may well be made to the cottony clouds with which they fill the air in the fruiting season is readily avoided by the planting of only the staminate form.

I have thus briefly called your attention to this important group of trees, confining myself, as I suppose was intended, to our native species; and I have done this the more willingly as I am confident that they are better in every respect, and for any purpose, than any foreign ones that can be introduced.

BLACK OR YELLOW LOCUST.

By John S. Hicks, Roslyn, L. I.

The locust takes its common name from its resemblance to the ancient locust mainly in the form of its leaf; and its botanical, *Robinia pseudacacia*, from its being introduced into France by either John Robin, gardener to Henry IV. of France, or his son, Vespasian, about 1601. It must have been taken from Virginia.

All evidence seems to point to Virginia as being the place of its most natural growth.

There are locust trees on the lawn of Daniel Bogart, at Roslyn, L. I., that were brought by Capt. Sands from Virginia, over a hundred years ago. I think there are but two kinds of the locust generally known: the black or yellow locust and the white locust.

The yellow locust may vary much in different localities and soils—some darker in colour than others—and this fact has also undoubtedly given the name of green locust. The yellow locust is the only one of value.

The white locust, the bark of which is much smoother, has more sap-wood and the heart is of a silvery whiteness. It is of little value, either for strength or durability, and I think, as this variety is easier grown from seed, that it is often planted in place of the yellow.

The trees of the yellow locust usually grow forty to fifty feet in height—occasionally ninety feet. After getting this size it grows very slow, and it is not profitable to graft to the larger sizes.

The young trees have sharp and strong prickles. These disappear largely after the tree has a growth of three to four inches, although the small branches always have some. It does very well on yellow sandy soils, and in yellow sand banks, with no alluvial soil covering the sand, it will often grow spontaneously; in heavy clay soils it often proves a failure. The fact that it will grow profitably upon soil that will not produce pasture or grow other trees of value, and after the trees have grown a few years, induce, by its shade and rich falling leaves a good growth of pasture, makes it the most valuable tree that is grown for profit. This also will make many unsightly spots beautiful and dreary hillsides profitable. The roots usually run near the surface of the ground and extend to a long distance.

It is now being largely used in re-foresting the desolate regions of Austria and Hungary—localities that have been made desolate by having the former forests destroyed. It thrives well in these countries, growing in thirty years to twelve inches in diameter. It grows well in portions of all the middle States, southern parts of the northern States and northern portions of the southern States. Some localities have attempted its growth and after the appearance of the borers abandoned it. While it often survives them, and sometimes if cut off after the borers have attacked it, the second growth thrived well.

The delicacy and lightness of foliage distinguish this from all other trees of cultivated wood-land, while the colour of its leaves, so different from others, makes its presence known at a long distance. The rugged character of rough bark, its singularly light and graceful foliage makes it a marked tree of peculiar beauty. Its leaflets are arranged in opposite pairs along the mid-stem, somewhat similar to the mountain ash. It is late in coming into leaf, and goes early in autumn; but in the perfection of its verdure no other tree rivals it.

The foliage is very fertilizing to the soil, causing the grass beneath to be always green and luxuriant. Its white and fragrant flowers appear in May and June. Tradition says the American Indian made the gift of a bunch of its flowers a declaration of love. The nightingale and other small birds resort to the protection of its thorny branches. When dry, the wood weighs 54 pounds to the cubic foot, green 62; by tests made at Brest and in the Woolwich ship-yards it was found to be about twice the strength of British oak. It is used largely in making treenails for fastening planks to wooden ships, for top timber and beams of vessels in exposed places. The most universal use is, however,

for fence posts and beams of cellars, or sills of exposed buildings; it has been known to last forty to sixty years as fence post—the writer knows of posts not over three inches in diameter that have been in use thirty years. Hough's Report on Forestry mentions its lasting fifteen to twenty years as railroad ties, while oak lasts only five to ten years, and chestnut six to eight years. The timber is used very extensively by carriage builders, and in some instances in preference to hickory. Brewster & Co., of Broome St., New York city, using it, and paying higher prices for it than for hickory,

On Long Island, near New York city, this tree is the most valuable grown. After thirty years' growth the tree will make posts eight, ten, and twelve feet long, three to five inches in diameter at the small end. In New York city the posts are worth, for 8 feet in length, 4 inches diameter, 48 cents; 10 feet, 4½ inches diameter, 77 cents; 12 feet, 4¾ inches diameter, 95 cents; 6½ feet fencing post, 4 inches diameter, 28 cents. The trees will often cut one piece or stick 12 feet, 1.10 feet, 1.8 feet, 1.6½ feet, making $248 per tree; these are the wholesale prices. In the most famed localities, and with five or ten years more growth, the tree will make, say one stick, 16 feet, 36 inches girth; 1.12 feet, 30 inches girth; and 1.10 feet, 25 inches girth, this making the tree worth $500 to $700, on the basis of 60 cents per cubic foot; it has sold in the past as high as $1.50 per cubic foot. As to value in other localities, Dr. Warder states that he is cutting trees having a growth of 24 years, averaging 12 inches diameter, and 60 feet high, trees making eight to ten good fence posts, 7 feet in length, 6 to 8 inches face at the top end, trees standing 400 to the acre.

Ezra Sherman, of Preston, Ohio, states that locust seed planted in 1830, three years afterwards the trees were planted in a grove of 15 acres, also an avenue of 200 rods. In 1870 two-thirds of these last were cut, 180 trees making 1,500 posts, worth 35 cents each, or $525, and Mr. Sherman says that the fifteen acres will furnish fence for the farm of 1,500 acres for all time, and that the pasture, together with stakes and poles for fencing, furnished from time to time, will pay as good interest as the open land would.

Waldo F. Brown, of Oxford, Ohio, states that the planting of locust is the best investment a young man can make, that the seeds should be planted in rows, and the seedlings transplanted in rows four feet apart, when one year old. When large enough for fences, stakes, and bean poles, cut out three-quarters, leave them, when five to seven years old, eight feet apart; as soon as the trees are out of the way of cattle, sow blue grass, as this does not injure the trees, and grows well, the pastures paying interest on the investment after five years.

As the trees send up suckers as well as sprouts from the stump, the growth is always increasing, and is thicker after such cutting. In France it is much grown for vine supports, and is sometimes cut every four years; the leaves being used for cattle food same as hay. In 1826 premiums were offered by the Massachusetts Society for Promotion of Agriculture for the promotion of its growth, and the extirpation of the borer.

The *New England Farmer* states the growth to be 300 to 600 posts to the acre, worth 50 cents each, besides the growth of pasture, and that the Government pays 75 cents per cubic foot at this time, 1826.

The *New York Cultivator* says, "1,210 trees grow to the acre, and that trees grown 28 years produce two to four posts each, and that trees grown from suckers or shoots are not so much inclined to seed, nor do the borers affect them as severely."

Allen Furnas, of Danville, Indiana, states "that he has grown the black locust over 20 years, and has had very little trouble with the borers; that it grows thrifty, making good fence posts in 10 or 12 years, and three to six posts in 18 to 20 years, growing 1,000 to the acre at eighteen years; the trees are worth 75 cents each. The timber will last an average of 35 years; grows well on poor soil."

In the years of 1828 to 1838 Joseph Hicks planted at Westbury, Long Island, on each side of the highway leading through his farm for about a quarter of a mile, locust trees, about eight to ten feet apart. The trees were gathered from different parts of the farm, where they had grown up from the roots of other trees; thus grown and planted with but little expense. When first planted the top was entirely cut off, they growing much better from this treatment. After thirty years of growth, and at least fifteen years of the most beautiful shade in the heat of summer, and an abundant growth of grass be-

neath, they were then sold for $500 as they stood, and now three trees are growing in the place of one, and as thrifty as the first crop.

It is thus seen that this tree grows in the most of our middle and western States, and will grow in many sections where it is not now known, and some, where it has once been condemned, the second trial will prove its value; the borers travelling some seasons and not others. It is worth the thorough trial anywhere, being the most valuable of our timber for durability, growing on poor soil where other trees will not grow, nourishing an abundant growth of grass, and finally, when cut, will send up twice or thrice the number of young trees. What tree can be, or is, of more value for forestry culture?

PROFIT OF DURABLE TIMBER.

By A. Furnas, Danville, Indiana.

Interesting as the growth of timber may be to all of us in its various relations, and while wide and extended its results may be, involving the beautiful in nature, the useful in art, controlling the elements as well as imparting sanitary influences; yet there is extant a feeling akin to belief that there is nothing real in it, that it is a sort of rocking chair speculation, very nice on paper, and represented in diagrams where all trees stand like so many posts or sentinels just where they were placed, and represent precisely just so much controlling influence, æsthetic, sanitary, or financial.

All new enterprises that contemplate an innovation on long-established usage, be they ever so wholesome, unselfish, charitable, or benevolent in their design, meet with sceptism if not outspoken opposition; and what is most remarkable, this spirit of unbelief emanates most frequently from those whom such proposition is designed to benefit or elevate.

However, my little paper is to deal with *facts* and *figures*, which, together, mean *stubborn truth*, and if I fail to show the practical value of durable timber, you will be left the alternative of deciding whether the fault is with me or my subject.

I shall confine my investigation entirely to the catalpa and locust, and assume without argument their great durability as well as the unlimited demand for such timber.

Much of the cost of timber grown by cultivation depends on the price of land on which it is produced. Assuming the average price of land away from the neighbourhood of cities and villages to be fifty dollars per acre, which would be a high estimate for us in Indiana, and the cost of catalpa plants set four feet apart each way, making 2,722 per acre, at a cost of $5 per 1,000—(I grow my plants and they did not actually cost half that figure)—we have thirteen dollars and sixty-one cents for plants. But the ground must be prepared for the plants, and the transplanting is rather tedious work, hence we will allow $11.39 for preparation of land and transplanting, making investment in plants and labour, $25 per acre. Total investment, $75 per acre. In Indiana lawful interest is 6 per cent. Now let us compound this amount for ten years, and we have principal and interest in round numbers, $134.30. To this we will add $5 annually for four years for cultivation. With us the renter never pays taxes, but we will add that which would be about $5. To this add $5 annually for keeping up fences and contingencies, and we are debtor:

To cost of land and plants compounded for ten years	$134.30
" cultivation four years	20.00
" fence and contingencies, tax, etc.	50.00
Total	$204.30

At the expiration of ten years we propose to remove one-fourth of the trees, which, if all are standing, will be 680, for which we may claim credit. Many of these by this time will make from one to two good fence posts, and at the lowest wholesale price in carloads would be worth 20 cents each. At an average of 20 cents per tree, we have $136, to say nothing of the tops for fence stakes and fuel, all of which will be consumed on the

farm. This reduces our debt to $68.30. This we will compound for two years more, and we are debtor to $76.73. At this time, twelve years from setting, we propose to remove one-half of the whole original number, which gives us 1,360 trees. These, at the very lowest estimate, are worth 25 cents per tree, or $340 for the lot; from this amount deduct our indebtedness, and we have a credit of $263.27. We will now compound this for four years more, and our credit is $332.35. To this amount we will add $50 for the land charged to us sixteen years ago, and as it is none the worse we will take it at its former appraisement. This further increases our balance to $382.35. Now we propose to close the account, and sell the one-fourth yet remaining—680 trees. These are worth a dollar a tree; from this, however, I must deduct the interest on the land for the last four years, which is $13.12. That leaves a net profit of $1,049.23. But suppose I am told that my last lot of trees are not worth a dollar apiece. To this I reply that I know of quite a number of *Catalpa speciosa* about that age, and for all such trees well-grown and within twenty miles of my farm I will give a dollar each and go after them. The catalpa in University Square, Indianapolis, have been set about sixteen years, and average one foot from the ground about one inch in diameter for every year of growth, and notwithstanding they have not been crowded so as to give them the most desirable shape, yet, if the city authorities wish to dispose of them I will take them at the above figure and be glad of the chance. Of course $25 would not move one of them, but as this is not their commercial value it cannot be used as a basis of calculation.

Forty years of experience as a tree-planter has taught me that trees do not always grow where they are set precisely as desired or indicated; but, as the catalpa transplants with a remarkable degree of certainty—even growing without roots—I believe on good ground it is within the scope of practical demonstration to realize three-fourths of the result above indicated; but should one-half be attained we have $524.61 as the return from one acre of land for sixteen years, and all this with very little labour or expense after the setting and three or four years cultivation at the beginning, after which they require no further care.

As to the question of the commercial demand I have no idea that it can be supplied in half a century, but so far as I am concerned with my little plantation it is for the necessities of my own farm. Every farmer should have a few acres of well-grown catalpa or locust from which to draw for the thousand and one demands of the farm. If we fence at all, I believe the coming fence will have posts. Just what this fence will be I cannot say; it may be boards, iron, steel—at all events it will require *posts*, and these posts should be as durable as possible, and catalpa being the best now known for that purpose will be in demand. But as I promised not to argue the demand for durable timber, allow me to refer to the demand for railroad cross-ties, piles for trestles, bridges and embankments, as well as telegraph poles, all affording an immense field for the use of this wood.

I have occasionally referred to the Black Locust. I am aware that it is not reliable in some sections of the United States; especially is this true of most of our western prairies, but in the timbered regions it generally succeeds, and on my own farm in a small plantation made some twenty-one years ago I am now realizing an actual profit, clear of all expense, of over $400 per acre.

There is a mystery about the growth of the Black Locust which I do not understand. I saw beautiful, thrifty, isolated specimens of it in southern Kansas and the Indian Territory, but wherever it had been set in quantities in the places above named it had in every instance been destroyed by the borer, and yet fifty or sixty miles south of Baxter Springs in Kansas, it is a beautiful forest tree with a body often fifty to sixty feet in length.

There is another feature of timber culture for profit which I have not mentioned, and that is the supply for those vast western prairies where land can be had for the planting, and in some instances, I believe, an exemption from taxes if planted to timber. The field for enterprise here is incalculable, the demand without limit, and yet the investment comparatively trifling. It is true the risks are more and greater. These are mainly drouth, grasshoppers, and fire.

The catalpa where fairly established might pass through a season without rain, but should the drouth immediately succeed the setting, the result would most likely be a total

failure. You cannot frighten a western man by saying "grasshopper," half so much as you can by "chinch bug." And yet on the theory that what has been done can be done again, we may at least be entitled to the benefit of the doubt. The grasshopper has in many cases devastated the whole country, and may do so again, and yet there is a sort of feeling of security among the western farmers which plainly says the grasshopper will not trouble us any more. Fires also do much mischief in the new prairie country. But as the prairie is broken, and the land brought under cultivation this trouble is no more liable to the west than in the older States, and this objection will be entirely removed. A number of Kansas men assured me that the grasshopper would not eat the catalpa, but as I have not heard this idea broached as a trueism, it should be further confirmed before being accepted. However, I have seen the catalpa at Kansas City, Fort Scott, and elsewhere in the State of Kansas, which had passed the grasshopper raid, that looked remarkably thrifty and nice. At all events, in view of all the drawbacks of this country, if I were a citizen there I would plant catalpa. I would not invest everything in it, nor would I make my plantation all at once. A few acres set each succeeding year, and on its rich soil, genial clime, and usually productive seasons I should confidently expect success four seasons out of five, and upon this ratio, with the extraordinary timber growth there so far outstripping anything we can do in Central Indiana, in a decade of years I should confidently expect more satisfactory results there than with us.

If this hypothesis be correct, the inducements to plant the catalpa on the western prairies are stronger and more numerous than with us, because the investment on those cheap lands would be comparatively nothing, while the demand for such timber must be greater than with us, as the country becomes more populous.

Thus, gentlemen, I have endeavoured to present the actual results of timber growth mostly on my own farm, which makes a good showing on the profit side, and that is all that I intended to do.

A NEW CATALPA.

By John C. Teas, Carthage, Mo.

The consumption of timber and the destruction of our forest trees are going on at such an alarmingly rapid rate, that public attention is becoming somewhat awakened to the importance of some measures for providing a supply for the future.

Of all the trees that have been suggested as adapted to the formation of timber plantations, the Catalpa stands pre-eminent. Its exceedingly rapid growth; its adaptation to almost all soils and situations; its wide range of latitude, extending from Canada to the Gulf of Mexico; its extraordinary success on the Western and Northwestern prairies; the ease and certainty with which it is transplanted; its strong vitality and freedom from diseases and insects; the incomparable value of its timber for the most important as well as minor uses for which timber is needed; the almost imperishable nature of the wood when used for posts, railroad cross-ties and in other exposed situations; its beautiful grain, and the high polish it bears, adapting it for furniture and fine inside finishing work, to say nothing of the handsome and stately appearance of the tree and the unrivalled beauty of its flowers, all point to the catalpa as the tree to plant.

[These remarks apply to the hardy, western, early blooming *Catalpa speciosa*, and not in any degree to the common catalpa (*bignonioides*), which, unfortunately, is the one usually met with in cultivation.]

A NEW VARIETY—OUR OWN HYBRID, AND HOW IT WAS PRODUCED.

In the year 1864, having already growing all the varieties of Catalpa then generally known to cultivators in this country, viz.: the common, the *speciosa*, the *Kœmpferi* and the *Bungei*, I procured from an eastern nursery, a tree under the name of "Japan Catalpa." Before I had become well acquainted with this new tree, I left my old home in Indiana and came to Jasper county, Mo., where I have since lived, and did not again see the tree for ten years. Two or three years after leaving the old place, I sent back for

catalpa seeds, and among the plants grown from these seeds were a few (perhaps the product of a single pod) quite unlike any catalpa I knew, and showing so many points of interest that I watched them with especial care—believing they must be from my Japan tree, because so different from any of the others. Being unable to identify it with descriptions within my reach, I sent samples of the flowers, leaves, seeds, etc., to eminent botanists, and others skilled in trees, in different parts of the country, and also tried to trace up the source from which the original tree had come. But nobody knew it. The botanists were unable to give me any assistance, and the efforts to trace the origin of my Japan tree only showed that it was grown from seed imported from Japan, without name, other than catalpa.

I have since visited my old place, and a careful examination of the original tree there, its leaves, bloom, seeds, etc., proved, to my surprise, that it is nothing more nor less than the species common in Japan, called by botanists Catalpa *Kœmpferi*, and *quite unlike* the seedlings I had grown from it. There could be but one solution of the difficulty, and that is, that the flowers of this tree had been fertilized by those of the *speciosa*, which grew not far from it, and thus produced, by natural hybridization, this new variety. This idea of hybridization had before been suggested to me by Robert Douglas and others, but I felt reluctant to accept the theory until after I had examined the parent tree.

The characteristics of the new variety are very marked, and partake largely of those of both its parents. In its vigorous, upright growth, it even surpasses them both. Its foliage is large and luxuriant, sometimes regularly heart-shaped, but often having sharp pointed lobes on one side or both, showing great diversity of form on the same tree. The lobed leaves—velvety purple or brown when they first appear—the yellow marking about the throat of the flower, and the early age at which the young trees bloom, all clearly point to the Japan influence in its parentage, while the American is unmistakably shown in the profusion of its large and handsome white flowers, and the very thin sap-wood. The seed-pods and seeds are very distinct, and are intermediate between those of *speciosa*, which are the largest of all, and those of the yellow flowering *Kœmpferi*, which are the smallest. It is the most profuse bloomer of all the catalpas, being literally loaded with flowers, and remaining in bloom for several weeks—a much longer period than the others. The individual flowers are the size of those of the common catalpa, not so large as *speciosa*, but this is more than made up by their greater abundance. They are white, with many very small purple dots and a touch of yellow, and are borne in clusters of extraordinary size, sometimes numbering as high as three and even four hundred buds and blooms in one great panicle. They do not all open at once, but keep up a succession of bloom for a long time. The flowers have a very pleasant and delicate fragrance, and a tree in bloom not only presents a magnificent spectacle to the eye, but also fills the air for quite a distance with its agreeable odour.

The leaves frequently attain immense proportions—occasionally measuring eighteen or twenty inches across, and even larger, and ONE MONSTROUS LEAF, carefully measured by Prof. G. C. Swallow, of our State Agricultural College, and myself, was twenty-five inches broad, and eight feet ten inches around the margin, not measuring the stem.

In the spring of 1880 I sent Prof. Geo. Husmann, at the State University, Columbia, Missouri, one thousand very small trees, culls out of the one-year-olds—many of them no larger than small straws. They were set in nursery rows late in May, and though it was a dry and unfavourable season, they made a surprising growth—many of them reaching a heighth of six feet or more, and from one to one and a-half inches in diameter, and straight as young Lombardy poplars. I also sent a dozen larger trees of the same, which were delayed on the way, and he wrote me were as dry as sticks when received, and he thought ruined. However, he planted them, and every one not only lived, but made a good growth.

Small trees planted in village lots, grew without cultivation, in five years, to be twenty-five feet high, and twenty-four inches in circumference at one foot from the ground; and I measured one shoot in the top of one of these trees, which had grown eight feet in a single season. They have made double the growth of other catalpas alongside, under exactly the same conditions, though the last have made a fair growth.

I have recently examined a grove of about 100 catalpas, of the various kinds, set eight years ago, on a farm which has been occupied by renters, and the trees neglected, and many of them injured and broken by stock. They have consequently not made the growth they would with better treatment, but as all have fared alike, a careful measurement may be supposed to show their comparative rapidity of growth. As in every instance that has come under my notice, the Japan Hybrid has far outstripped all the others. It measured 25 feet high, and 33 inches in circumference, a foot above the ground. *Speciosa* came next, 20 feet high, and 24 inches in circumference. *Bignonioides*, 14 feet high, and 19 inches in circumference. These were all represented by numerous specimens. There were but one or two *Kœmpferi*, and they were small,—probably the result of accidental causes, as it is a good grower. Had these trees been cut, the tops of the stumps would measure in square inches,—the *common* 31, *speciosa* 50, and the *Japan hybrid* 95. Taking the height of the trees into account, the difference is still more apparent.

The well-known character of the catalpa for durability, and the close resemblance between the wood of this and that of its parent, the *speciosa*, leave little room to doubt its being similar to the others in its power to resist decay. As a timber tree it promises to be of the greatest value, and to take a place in the very front rank, on account of the wonderful rapidity of its growth, which equals that of the most luxuriant trees of temperate climates, while its hardiness has been repeatedly demonstrated by its standing uninjured, with the thermometer at twenty-five degrees below zero, showing that it is abundantly hardy for the latitude of Kansas, Missouri, etc., though it has not yet been so fully tested as *speciosa* in the extreme north.

We have grown several thousands of these seedlings, and it seems like being a well-established variety, though, of course, there are some variations in growth, habit, colour, foliage, etc., among the seedlings, but these variations scarcely appear greater or more strongly marked, than are seen in different trees of *speciosa* or *bignonioides*.

While its vigour, hardiness, freedom from insects, etc., recommend this new tree so strongly for timber plantations—the same qualities, added to its stately habit, the magnificence of its bloom, its fragrance and the beauty of its ample and diversely shaped foliage, cannot fail to make it popular as a tree for shade and ornament.

SOME OF THE BEST TREES TO GROW FOR TIMBER IN MICHIGAN.

By W. J. Beal, Lansing, Michigan.

Michigan Agricultural College is located at Lansing, about seventy miles north of the Ohio line. This neighbourhood was nearly all a wilderness thirty years ago. It is not ten years since people rolled up large heaps of logs and burned them to get them out of the way. As a people, in Michigan we are hardly yet "out of the woods."

Our most valuable forest trees found in abundance were Black Walnut, White Pine, White Ash, White Oak, Shag-bark Hickory, Black Cherry, Tulip-tree, Rock Elm, Sugar Maple, and Arbor Vitæ. Of these, White Oak, Tulip-tree, Rock Elm, Arbor Vitæ, Sugar Maple grow too slowly to be desirable trees to plant for growing timber.

I have been Professor of Horticulture in Michigan Agricultural College for nine years, and in many ways have done the best I could to advance agriculture. But little means has been offered for making experiments. Of all the efforts made, I can now think of nothing which gives more satisfaction in proportion to the cost than a couple of acres planted with a large variety of the seeds of trees. The interest in our little arboretum must continue to increase rapidly as the trees become larger and the country grows older.

I will only give you my notes on a few species, at this time.

Except *Populus balsamifera*, I have only some very young specimens of poplars.

In the spring of 1873 I sowed some seeds sent by the United States Department of Agriculture. When three years old, they were transplanted to their present position. They

fruited when six years old, and have fruited every year since. There are only nine trees of this lot now standing in the arboretum. They proved to be *Catalpa speciosa*. They have passed through two very cold winters when the thermometer reached thirty-two or thirty-three degrees below zero. A few of the thriftiest limbs were injured, but the trunks are sound, at least, to all appearance. The trees have had plenty of room, nothing shading them to prevent the tops from spreading. There is quite a tendency in the limbs to split off at the crotches, much like *Ulmus Americana*. These trees, with a growth of nine years, transplanted when three years old, now measure from sixteen to twenty-four inches around at one foot above the soil. Five feet above the ground, two of the trees each measures sixteen inches in circumference. They are a trifle over twenty feet high. They have not grown as fast as *Acer dasycarpum*, Silver-leafed Maple. Some of the latter measure, with a growth of eight years, twenty-two and a half inches around and run up twenty-eight or thirty feet. The tops have plenty of room and are large and spreading. Some White Ash were grown from the seed six years without transplanting. Many of these are eighteen feet high, and from eight to nine and a half inches in circumference, one foot from the ground. From the first the trees have been straight, clean and handsome. Some Basswoods and Butternuts of the same age and with the same treatment have trunks a trifle larger at the base, but they are more tapering and not so tall. Some Black Walnuts have grown five years where the nuts were planted. Many of them are fifteen feet high, and measure seven and a half to eight and a half inches a foot from the ground. They are straight, healthy and beautiful. We are north of the line where many good Black Walnut trees grow in the forest. It is quite safe to plant them on soil where they grow well in the native forest.

My friend, James Satterlee, of Greenville, Montcalm county, lives about one hundred miles north of the Ohio line. On his father's farm were planted some trees of which he writes as follows: "There are about seventy Chestnut trees. The nuts were planted in the spring of 1863, and set in the spring of 1865 from 25 to 30 feet apart, irregularly. They were cultivated with corn or potatoes for five years, then seeded to clover, which remained two years, then they were again cultivated for two years, since which time the orchard has remained seeded. The trees are all healthy. The tallest are about thirty feet; the largest forty-two inches in circumference one foot from the ground, and thirty-six inches, four feet from the ground. There are some Black Walnut and Butternut trees of the same age. The largest Black Walnut is forty inches in circumference, and not quite so high as the chestnuts. The largest Butternut is thirty-five inches in circumference and a little lower than the walnuts. The chestnut trees vary considerably in their productiveness. Some bear five or six nuts in a burr; some bear much larger nuts than others. One tree holds its leaves all winter. This orchard of nut trees is well known for miles around, and is one of the attractions of the neighbourhood which is in a new country."

Of forest trees indigenous to Michigan, all things considered, where the site and soil are suitable, I should select to plant for timber Black Walnut and White Ash. I am *not yet certain* that it would be better to plant European Larch, Silver Poplar, Cottonwood, Silver Maple, Butternut or any other foreign species.

FORESTRY IN MICHIGAN—OUTLOOK AND SUGGESTIONS.

By V. M. Spalding, Ann Arbor, Mich.

It is not necessary to go into an argument to show that Michigan ought to be interested in forestry. Everyone knows what an element the forests have been in our prosperity. According to a late report of the Commissioner of Immigration "the aggregate value of the forest products of this State already mentioned is largely in excess of $800,000,000," and the timber product of a single year, 1879, amounted to $60,000,000, or about thirty-five per cent. of the total value of the natural productions of the State for that year. Michigan produces more salt than any other State in the Union, and the

brine is evaporated by means of the refuse from the great saw-mills in the vicinity of Saginaw and other lumbering towns. Ours is the second State in the production of iron, and the blast furnaces of Ironton, Elk Rapids, and a number of other places are drawing their supply of charcoal for its reduction from the great hardwood forests in their vicinity. The products of these forests are sent to the ends of the earth. Much of the first lumber of the Atlantic cities and of the Old World comes from Michigan pineries. Threshing-machines made in Battle Creek are sold in South America and Australia, and farming implements, furniture, and a long list of articles requiring wood in their manufacture are made in the State and exported from it, their manufacture being a source of support to fifty thousand of our people and their sale a steady source of wealth to the State.

Nor is it necessary to repeat the well-known fact that our forests are rapidly disappearing. The bulletins of the last census, accessible to everyone, show that the estimated amount of merchantable pine timber standing in Michigan May 31st, 1880, was thirty-five billions of feet. At our present rate of consumption, five billions of feet annually, it will take seven years to use up our pine forests. Suppose, however, that the estimates of the amount remaining, although made with great care, are too low ; suppose for safety that the pine will last twice as long as has been estimated, the fact still thrusts itself upon us that in a few years this great source of our wealth will be gone.

What are we doing in view of these facts? We are going on with astonishing energy and improved machinery to hasten the end. Every man who can do so is trying to get a piece of pine land, or a quantity of logs before they are gone, and our own people, in company with eastern capitalists, are planning the speedy destruction of the hardwood forests as soon as the pine lands have been stripped. The newspaper articles that charge these things upon us are not sensational. They do not tell all the truth. We have squandered with reckless haste the abundant forest wealth with which the State was endowed, and, besides all this, time and again, forest fires, that might have been prevented, have swept over fair portions of the commonwealth, carrying swift destruction with them and completing the work that the axe had begun.

In the study of this subject then we may as well turn our attention at once to the forests of the future, for it is evident that those of the present will be gone in a few years. Our own legitimate wants and the great profits of the lumber trade have already settled the question for Michigan. If we want forests we must make them.

Without repeating the arguments that have been given so fully by others, I shall assume, what is admitted by everyone who has ever bestowed serious thought upon the subject, that the highest welfare of the State requires the establishment and continued maintenance of a suitable proportion of wood-land. It may be assumed, too, that, in due time, both Government and people, moved by necessity, if by no higher influence, will unite in a settled purpose to secure this. As soon as this attitude is taken by the people of the State, and we are ready to enter upon the work of reforesting, we shall find ourselves face to face with various difficult practical problems. Some of us, perhaps, may render a service by studying these problems now, viz.:—

(1) What parts of the State and what proportion of its area should be covered with forests?

Economists estimate about twenty-five per cent. as a suitable proportion ; but this varies with the position, physical character, and commercial interests of the State or country under consideration. The State of Michigan contains large areas that are worthless for any other purpose than raising timber, and still more extended regions that, if not absolutely valueless for agricultural purposes, can be used to far better advantage in growing trees than in raising any other crop whatever. Undoubtedly, the great question with us is, How, in the most direct practical way, can we rehabitate the extensive regions in the central and northern parts of the lower peninsula that have been stripped of their pine forests, and the remaining portions of this region that will so soon be bare? Anyone that has been through this part of the State will remember its desolate and ruined aspect. "The valuable trees were all felled years ago, and the lumberman moved on to fresh spoils, leaving behind an inextricably confused mass of tree tops, broken logs, and uprooted trunks. Blackberry canes spring up everywhere, forming a tangled thicket, and a few scattering poplar, birch, and cherry trees serve for arboreal life, above which tower the

dead pines, bleached in the weather and blackened by fire, destitute of limbs, and looking at a distance not unlike the masts of some great harbour. Thousands of such acres, repellant alike to botanist and settler, can be seen in any of our northern counties."* While there is good soil to be found in this region, much of it is light and sandy, altogether unfit for farming purposes, but it has raised one of the finest forests that ever clothed the surface of the earth, and if it can again be covered with such a forest it will become in the future, as it has been already, a source of almost unlimited wealth.

Another portion of the State will soon force itself upon our attention, unless it is cared for. All along the eastern coast of Lake Michigan sand-dunes extend, precisely similar in their nature, though of less extent than those of the old world, while these dunes are covered with vegetation they keep, for the most part, within their limits, but indications of what they may do, when free from such control, may be seen at Grand Haven, Michigan City, and other places along the shore, where piles of fine, drifting sand are covering railroad tracks, and fences, and some trees, and, in some localities are encroaching upon cultivated fields, to the dismay of their proprietors. The experience of Western Europe is conclusive upon this point, and it is the manifest duty of the State, and of the people, to absolutely prohibit and prevent the clearing away of trees, or even excessive pasturage of such lands, and to encourage, by every suitable means, their reforesting.

The farming lands in the southern portion of the lower peninsula all need a fair proportion of woodland for fuel and shelter, and the great majority of these farms would be rendered much more valuable in a few years by judicious plantations of trees; so, also, the northern peninsula, though still heavily wooded over large areas, already has extensive regions that have been stripped of their forests, and that can be turned to better account for this than for any other purpose. We may safely conclude, therefore, that the State of Michigan requires fully as great, and probably a greater proportion of its area to be kept in wood-land than has been estimated as necessary for other countries; in other words, more than twenty-five per cent. in this State, rather than less, may properly be covered with timber.

(2) What kinds of trees shall we plant?

To answer this question we must know something about the different species of trees, the soil and climate to which they are adapted or to which they can be induced to adapt themselves, what kinds will endure unfavourable conditions best, what trees will grow rapidly, and what sorts are most valuable for timber or other products.

Without attempting to decide all of these questions in detail—many of them requiring not only careful study but long experiment, for which the State makes no adequate provision, as yet—there is one very important question suggested at the outset, and that must be met, whether it can be settled at once or not. The question is, How much significance must be attached to the principle of rotation? It has been commonly noticed that forests of oak succeed those of pine, and *vice versa*. Oak and hemlock forests have been succeeded by those of elm, beech, and maple. When the pine woods in the northern part of Michigan and Wisconsin are cut off, poplars, birches, and the wild Red-cherry spring up, and so, as in many cases, this succession seems to be pretty uniform and constant. There has grown up a half popular, half scientific notion that it must be so, and that, if we are to succeed in reforesting our denuded pine lands, we must follow the order of nature. We have no right, however, to follow nature blindly, and sometimes we can take a short cut while nature is going round a corner. No one has ever formulated an order that governs the succession of forest trees, nor has it ever been shown that there is any such unvarying order of succession. On the contrary, it is one of the most variable things with which we are acquainted, and there is every reason for believing that it depends more upon what the ground is seeded with than anything else. The reason why birches, poplars, and wild Red-cherry trees spring up on our wasted pine lands is that the seeds of these species are carried there by the wind and by the birds, and there is no doubt whatever that other and better trees may, with suitable pains, be made to take their place. When we plant trees about our houses, or along the highway even, if it happen to be new land, we do not stop to make a critical inquiry into the laws governing the

* Erwin F. Smith, "Flora of Michigan."

succession of forest trees; we find out what trees are hardy, and, having settled this point, set out whatever kinds we fancy, with the expectation of having them do well if they are cared for.

(3) Shall we plant the White Pine in Michigan?

The answer may be given without hesitation. Yes; plant it first, and last, and all the time. Give it a fair chance and it will cover the State again. It may be wisdom to substitute some other species on those tracts that have just been covered with a heavy growth of pine, but it is, to say the least, doubtful whether any such distinction need be made. If the White Pine were planted in Michigan universally and everywhere, where the land could be spared, it would find congenial soil enough even in those counties that have been most heavily covered with it.

Without discussing the value of other well-known species a few may be mentioned as specially worthy of planting in Michigan. The European Larch, famous for the durability of its timber, and perfectly adapted to our northern climate; the *Ailanthus*, the only tree that has successfully controlled the drifting sand plains of southern Russia, and will perhaps be more valuable than any other on our own sand dunes; the *Catalpa speciosa*, of which specimens a foot and a half in diameter may be seen in Ann Arbor, and which, probably, may be depended upon for hardiness throughout the southern portion of the lower peninsula; the white ash and a long list of indigenous trees, any of which may be planted with every reason to expect a good return. The consideration of the large number of species, both indigenous and introduced, that may be successfully cultivated in Michigan is of great importance, but requires too much space for this article, and will have to be taken up in a separate paper, together with the consideration of the species best adapted to our sand-dunes, and the methods to be employed in planting them.

4. Admitting that it is desirable that the planting of trees in Michigan should be undertaken at once and in earnest, what are the means of securing this and of ensuring the best results?

(1) The Legislature of the State may promote the work by offering encouragement to tree planting in the way of exemption of property from taxation. As to the form of legislation and its practical details, a careful study of the action of other States will furnish valuable suggestions. Of all State laws on the subject of tree planting that have come to my notice, that of Iowa has seemed preëminently adapted to the purpose. The law provides that "for every acre of forest trees planted and cultivated for timber within the State, the trees thereon not being more than twelve feet apart, and kept in a healthy condition, the sum of one hundred dollars shall be exempted from taxation * * * for ten years after each acre is so planted; provided, etc." Possibly other forms of legislative action on this subject may be found better, but that of Iowa has this very excellent feature, that it has very largely accomplished the object aimed at. We can profitably follow the example of Iowa, too, in securing the preparation and distribution of something corresponding to their "Forestry Manual," an unpretentious pamphlet of about thirty pages, filled with valuable information and practical hints on the subject of tree planting, and distributed gratutitously among the farmers of the State.

(2) The State ought also to be establishing facts upon which to base the future management of the great work of reforesting its waste lands. Two or three experimental stations, located in as many parts of the State, where trees of all sorts, both native and foreign, can be cultivated and the results recorded, would enable us in a few years to demonstrate the usefulness of some kinds and the unfitness of others for general cultivation. Meteorological observations carried on at these stations would give data for the solution of the difficult but important question relating to the climatic effects of forests.

(3) Very much depends upon the railroad companies, owning as they do, in the State of Michigan, lines aggregating over four thousand miles in length, with large grants of valuable land, they control, in a very great measure, the agricultural and commercial interests of large areas of the State. The Detroit, Mackinac and Marquette Railroad alone owns over 1,300,000 acres of land, and the Flint and Pere Marquette, the Grand Rapids and Indiana, and other lines are possessed of large tracts of both farming and timber lands. An abundant supply of wood for ties and manufacturing purposes is a prime necessity of all these lines, and may be secured by the prompt adoption of a

liberal and enlightened policy in maintaining or restoring a suitable amount of forests on their lands. A number of western railroads, though obliged to contend with great natural disadvantages, have taken hold of this work with great enthusiasm, and several of them are now employing paid foresters to direct the work of raising and caring for forests along their lines.

(4) The farmers of the State have very much to do with the future of our forests, and, unfortunately, they have not yet, as a rule, taken a practical interest in maintaining or restoring them. There is, however, no class more ready to enter into undertakings that promise to be productive of good, and none more accustomed to meet and overcome difficulties. When the farmers of Michigan are once possessed with the conviction, that trees are often far more valuable than any other crop, and that they render the farm more productive and worth more per acre, trees will be planted.

(5) A few at least of the educational institutions of the State can do an important work by giving forestry an honourable place among the subjects of their respective courses of study. Whether there is as yet a science of forestry in the United States or not, there will be before long, and intelligent and interested action on the part of such institutions will aid greatly in establishing the science, and in gaining for it the confidence and encouragement of both government and people. A beginning of this kind has been made at the University of Michigan, in connection with the School of Political Science recently established there, and the lectures on forestry are attended by a class of about fifty.

(6) The General Government still owns something over a million acres of land in Michigan, and the State Government has yet large tracts of land under its control. If, instead of throwing this away, or selling it at the rate of $18 per 160 acres, any considerable portion might by any means still be kept in permanent forests under Government control, and this control be exercised wisely and for the public good, as is done in the State forests of the old world, forestry in Michigan would become an established fact. In some or all of these ways it is to be hoped that the great work of restoring the forests of the State may be accomplished.

POPLAR TREES FOR THE MANUFACTURE OF PAPER AND CHARCOAL.

By Wm. Saunders, London, Ontario.

Within the past few years the consumption of the wood of several species of poplar for paper making has greatly enhanced the value of these trees, and so extensive has been the demand that in many sections it has been difficult to supply it from the immediate neighbourhood, and this wood, hitherto of little value, now commands a price nearly or quite equal to the more valuable sorts. The species which have, up to the present time, furnished the bulk of the wood used in paper-making, are the aspen or Trembling-leaved Poplar *(Populus tremuloides)*, and the Silver-leaved or Abele of Europe *(Populus alba)*. These have also been used to some extent by charcoal-makers, and are found to produce a superior quality of charcoal. Doubtless the Large-toothed Poplar *(Populus grandidentata)*, and the cotton-wood of the North-West *(Populus monilifera)*, and probably the Balsam Poplar *(Populus balsamifera)*, being similar in their structure and characteristics, will prove almost, if not quite, equal in value to the two species first named.

These trees are of very rapid growth, most of them thrive on inferior soils, and are capable of cultivation in almost all the settled portions of the Dominion. The aspen is said to be the most widely diffused tree of North America, and one of the most abundant in the Far West, where it ranges from the Arctic regions to California. It extends over the southern half of the Labrador peninsula, and is common throughout the whole region from the Gulf of the St. Lawrence near the mouth of the McKenzie River, about latitude 67. Throughout the North-Western Territories it is the commonest tree in the partly-wooded and prairie districts, and is the chief fuel used at the Hudson Bay Company's posts and by the Indians. The quantities of this wood existing in the forests throughout this vast area are immense.

The balsam poplar is distributed over an area almost as great as that of the aspen extending to about the same point north, and about Lakes Huron and Superior and in the valley of the McKenzie River attains a large size.

The large-toothed poplar does not range nearly so far north, but is abundant in New Brunswick and Gaspé, and is found in most parts of Ontario and Quebec.

The cottonwood is very common throughout a large portion of the North-West Territories, where it is the chief source of fuel for the settlers.

The silver-leaved poplar was introduced as an ornamental tree from Europe, and the rapidity of its growth and beauty of its foliage induced many to plant it. It will thrive well in waste places and in the poorest soil. While young it forms a rather pretty tree, but becomes ungainly as it grows older, and its persistent habit of sending up suckers from the roots has almost led to its abandonment for ornamental purposes. Wherever this tree has been planted throughout the northern United States and Canada, it has, as far as is known, proved hardy, and in rapidity of growth it has few equals, the trunk often attaining a diameter of two feet within fifteen years. Isolated trees usually have low and wide-spreading heads, but closely planted in groves they run up tall and straight, and the poles taken out in thinning can be turned to many useful purposes, and the trees when grown converted into useful lumber for building purposes where other timber is scarce.

Poplar trees may be grown from cuttings, suckers or from the seed contained in the catkins. Cuttings may be made from two or three to five or six feet in length, and from an inch to two or three inches in diameter. They should be taken from the young woods and the larger end sharpened by a sloping cut on one side to expose the bark. Suckers can usually be obtained with a small proportion of root and grow very readily ; cuttings, suckers, and young trees should be planted four feet apart. If young trees are to be raised from seed the catkins should be gathered in June, the seed rubbed out with the hand and mixed with sand to facilitate even sowing, planted in drills on mellow, moist soil from half an inch to an inch deep, and kept free from weeds during the summer ; the young trees will be ready for planting the following season.

On most farms there are waste places, broken land, or small areas of poor soil unsuited for general agricultural purposes, probably nothing could be used to occupy so profitably such waste places as poplar trees. In addition to the value of the thinnings while growing and such portions of the wood as the owner may choose to sell when grown, he might enjoy all the advantages resulting from adjacent forest growth. Such clumps or belts would act as useful wind breaks, protecting the crops in adjoining fields; they would help to equalize violent alternations of heat and cold, exercising a conservative influence on the humidity of the atmosphere, aid in inducing rain fall and in purifying the soil and the air.

FOREST TREE CULTURE.

By Hon. H. G. Joly, Quebec.

The European traveller who visits only the settled parts of this Province, is invariably disappointed at the scarcity and meanness of our trees. Of course, if he leave the beaten tracks of travellers, and goes far enough into the wilderness, up the Ottawa and the St. Maurice, he will see fine timber, but, in our settlements, we can only show him, here and there, at long intervals, one solitary elm, model of grace and beauty, and the traveller will feel, as we do, grateful to the man who spared that tree.

On a warm summer's day, the Desert of Sahara, with its lovely oasis, would be suggestive of coolness, compared with our country. No trees to shade the dusty roads, to shelter the panting cattle, to set off the neat white-washed houses ; only far away, hidden nearly out of sight, the patch of small neglected timber which the farmer is compelled by our stern winters, to spare from the general slaughter, as, without fuel, he will die.

If every acre of ground were covered with valuable crops, one would try and get reconciled to the absence of trees, and bow to the iron rule of our age which converts everything into cash. But what a small proportion of all that ground is used profitably !

We can find plenty of spare room for growing forest trees; they are not only the most beautiful ornaments to a country and the most useful product of nature, giving fuel, timber, shade, shelter, retaining moisture and a protection against droughts, etc., etc., but, considering the question from a *strictly money-making* point of view, the culture of forest trees is perhaps the *best and safest investment* that can be made.

It is rather difficult, I admit, to induce people to plant forest trees in this Province, where, for generations, they have been brought up to look upon the forest tree as their natural enemy, to be got rid of at any cost, hacked down, burnt out of the way (for want of a better mode of disposing of it), and still troubling the settler for years with its everlasting stump, an obstacle to thorough cultivation. The children and grandchildren of the old settlers remember too well; they cannot be expected to love the forest tree, but self-interest ought to conquer instinct and prejudice. With us, land is not too valuable for forest tree culture. In Europe, where land is scarcer and more valuable than here, they plant, every year, thousands and thousands of acres in forest trees.

To those who say that our country is *too new* to think of that, I will answer that New Zealand, the Australian Colonies, India (so far as the settlement of the land by Europeans is concerned), are newer countries than ours, and they are all taking active steps towards the planting of forest trees on a large scale. In the United States, the Federal as well as the State Governments encourage the culture of forest trees by grants of land, and money, and exemption from taxation, and powerful societies are co-operating with energy and liberality. The Government of Canada has begun by offering free grants to those who undertake the planting of a certain number of trees on the western prairies; but I will here observe that it will require more active measures to set the people in motion, and especially the establishment of nurseries, where the people can buy young trees and seed, and the beginning of some large plantations, as an example, to show to the people, by practical results, that the culture of forest trees is within the reach of every one.

We see in the papers that the western railways have started the culture of trees on their own account; the St. Paul, Minneapolis and Manitoba Railway is reported as having appointed a superintendent of tree culture, who has just contracted for three hundred thousand trees, and most of the roads west of the Mississippi and Missouri rivers have also begun to raise trees, in order to insure a supply of ties, and for other purposes.

How many give as their reason for not planting forest trees, that they will not live long enough to get any profit out of them. You do not hear that in Europe. Are people more selfish in America than they are in Europe? Or is the feeling of self-reliance so much more developed in America that the people here expect the next generation to take care of itself as they have taken care of themselves? Then leave them some timber, if you wish them to have the same chance that you had. It was but a heathen who wrote, more than eighteen hundred years ago: "*Arbores serit diligens agricola quorum fructus numquam videbit.*" "The good husbandman plants trees whose fruits he will never see." But I must not drift away from my subject into philosophical considerations; it will be more to the point to show that the profits of forest tree culture are not only enormous, but that their realization is far from being delayed to an indefinite future.

I do not pretend that the whole of our farms should be planted in forest trees; that would be too absurd. Our farms are generally too large for the small number of hands we employ; there are always some odd corners, idle strips, stony or damp patches which it does not pay to cultivate; begin and plant forest trees there, suiting the tree to the nature of the soil—you will find some for every kind of soil. Once planted and fairly started, they will take care of themselves, give no trouble and increase yearly in value, in a wonderful ratio, so well expressed by the Honourable F. B. Hough, chief of the Forestry Division of the United States Agricultural Department, in the address lately delivered by him at Columbus, Ohio.

For years past, I have sought the best and cheapest mode of re-wooding our denuded lands, and have made some experiments; they have not yet been carried over a great many years and are, so far, most encouraging, notwithstanding my numerous mistakes and enforced absence at the best seasons, and they satisfy me as to the correctness of the statements made by the leading advocates of forest tree culture. I trust not to be

charged with egotism if I now give the results of some of those personal experiments, rather than copy or condense what has been written by others, and it will be a great satisfaction if I can induce a few to try for themselves.

In selecting forest trees for planting, the first consideration ought to be the nature of the soil where they are to be planted; if the soil is not favourable to one kind of tree, do not waste your time in planting it there; you will find another tree that will suit the soil. After paying all due deference to soil and climate, you must be guided in your selection of a particular kind of tree: 1st. By the value of the timber. 2nd. The greater or lesser ease and certainty with which the tree can be grown. 3rd. The rate of growth.

I have tried principally black walnut, oak, elm, maple, ash, tamarack, Russian pine, and fir and poplar, and will now give some of the results.

Black Walnut—The value of that wood is so considerable (a dollar a cubic foot at the present time), and it is getting so scarce that it struck me as the most worthy of being introduced and cultivated here. True it did not grow spontaneously any where in the Province of Quebec, but this appeared to me no conclusive reason why it should not grow and flourish here. The lilac comes all the way from Persia, and it spreads out its leaves earlier and keeps them unchanged later than our typical tree, the maple. I did not fear our great colds, for in the West, the natural home of the black walnut, the thermometer often ranges as low as here, though for a shorter period at a time. It was well worth trying.

I procured a bag of black walnut nuts from the West in the fall of 1874, and sowed them at once; it was late in November; we had to remove the snow and break the frozen ground, but I thought the earth the safest place to winter them. They began to come up about the tenth of June following; not five per cent. failed, and they have never been artificially sheltered in any way. It would not be worth while introducing them here if they could not take care of themselves.

Of those left undisturbed where they were sown, I have not lost one; they have now had six summers' growth. I have just had some of them measured, so as to be certain of their size; the height of the four largest is as follows: fifteen feet and a half, fourteen feet and a half, fourteen feet and twelve feet, and thick in proportion. Those have not been transplanted; now notice the difference between them and those that have been moved.

In the fall of 1875, when they were only one year old, one lot were transplanted, but the soil was not favourable and they have not done well, so far; however, they are beginning to recover. In the spring of 1876 I transplanted another lot; the best are about eight feet high; and another lot last spring, the tallest of which are about ten or eleven feet. All those trees are the same age as the fifteen and fourteen feet trees; the difference in size results from the transplanting, wherefore it is much better to sow them at once where they are to remain. Plant them thick, as the wood of the young tree is rather soft, like that of our native butternut.

It is contrary to all preconceived ideas, even among those who handle timber every day, but nevertheless true, that the black walnut *(Juglans nigra)* and the Canadian oak *(Quercus alba)* as a rule increase much more rapidly in girth than our pine and white spruce. I conclude, from counting the rings on the trees after they are cut down, and from watching the growth of the living trees, that black walnut and Canadian oak generally gain one inch in diameter in about three years and a half, while our spruce and pine take about double that time to accomplish the same result; this can easily be ascertained by counting and measuring the rings. Of course there will be exceptions, and it would not be fair to judge by those only; I speak of the average.

It is now time to say something of the profits, and I must be careful to avoid exaggeration. Judging by the growth of the living trees and the rings of the timber, when cut, I do not hesitate to say that a black walnut, under ordinary circumstances, at the age of seventy-five years, will have attained twenty-one inches in diameter and will contain at least fifty cubic feet of timber, the actual value of which is about one dollar per cubic foot. (See for prices the *Lumberman's Gazette*, published at Bay City, Michigan, the numbers of the 26th January, 2nd February, and 2nd March of this year.)

For how many such trees, judiciously planted, will there be comfortable room on one

superficial acre? It is difficult to find a regular plantation of any kind of trees of that diameter here, to help us toward a solution of the question, and the way in which trees are scattered in the forest and their irregular size leave but a vague impression on the mind, varying according to the personal experience of each. I am not ready to answer the question at present for want of full information, and will not venture a guess, but I do not feel the same hesitation where trees standing in one single row, with plenty of room on both sides, are concerned; in that case, trees twenty-one inches diameter would not be too close, standing at eighteen feet from one another. Take a farm three acres wide, with a road across the width and row of black walnuts of an average diameter of twenty-one inches on each side of the road, the trees eighteen feet distant from one another, you get sixty trees containing fifty cubic feet each, three thousand cubic feet, worth, at the present price, three thousand dollars.

But it will be safer to sow the black walnut in clumps, pretty close. They will protect one another when young, and, as they grow, they can be thinned gradually. Their culture will entail little trouble, apart from the preparation of the soil, and the sowing of the nut; the work of thinning will soon repay itself with the timber removed. The better the soil, the quicker the growth. Such a valuable tree as the black walnut deserves to be well treated. If possible, find some shelter against the strongest prevailing winds for the young plantation, a belt of older trees, or a hill. They are rather soft, like our butternut; it is the only drawback I have found out so far, but not fatal. Even the youngest trees will get several branches torn off and very ugly wounds without dying; they are wonderfully hardy.

The value of these plantations will increase steadily from the day when they have taken root; they represent an ever-increasing marketable value long before the expiration of that period of seventy-five years which I have indicated—not as the limit of their growth; they will grow for centuries, but—as the period necessary to attain a profitable size, when they can be cut down without waste.

The Butternut grows spontaneously here; its beautiful timber can be worked with as much ease as the softest pine; it ranks immediately after the black walnut, and is inferior to it only in the colour of the wood, which is lighter. Rubbed with linseed oil, it takes the soft, rich hue of sandal wood, and if judiciously sawn, shows wonderful marks. I recommend strongly its culture, and will be glad to send nuts to those who will plant them, next fall, as we gather a large crop of them.

White Oak—The acorn ought to be sown as soon as possible after it drops, in the fall, as it loses its vitality rapidly, and to avoid the great check resulting from transplanting, it ought to be sown at once, if possible, where the tree is destined to remain. Its wood is tougher, and not so liable to break when young. I think it ought to grow with at least as much ease and rapidity as the black walnut; ours are rather behind, as they have been transplanted twice. The oak is so useful and valuable, and its culture so easy, that every plantation of trees ought to contain a good proportion of oak, provided the soil be not too poor for it.

White Elm—This splendid tree recommends itself sufficiently by its beauty and usefulness to dispense me from dwelling at any length upon it; it grows rapidly in a deep, damp soil. I have not grown it from seed, but by taking up young trees from a low island, where they grow in abundance. It appears to bear transplanting better than the oak, walnut or maple, and can be moved safely of a much larger size than any of those trees.

Maple—If you wish to raise a maple sugary with the smallest amount of expense and trouble, go to an old maple grove in the fall; the ground is covered with a thick carpet of seedlings. After rain, you can pull them up by hand with the greatest ease, without breaking any of their small roots, if you are moderately careful. Plant them at once in a corner of your garden, about two feet apart each way; weed during the first two summers with a light hoe. We found, after four years, the trees fit for transplanting, about five feet high, and the thickness of a man's thumb. As the ground was mellow and free, we took them up with little damage. Of course, there is still the objection of transplanting, but in a less degree than when you seek your maples in the woods, where their roots are mixed up with those of other trees, stumps and stones, and must be more

or less torn up with violence. There is an immense difference in the comparative cost of the two processes, which will tell upon the hundreds of trees required to make a sugary worth working. Those small trees never fail (at all events, none of those we transplanted did), while much larger trees, more injured in the moving from the forest, die in great numbers, and the survivors are seriously checked. I have been told that the seedlings would overtake them, but have not yet had time to verify that statement. Maples will begin to yield a reasonable quantity of sap for sugar, when about twenty or twenty-five years old.

The Ash—It is well known, and its different varieties are found very useful, especially the white ash, which recommends itself for its elasticity; its wood is beautifully marked, and is largely employed in the making of furniture, panels, etc. It will thrive where the walnut, oak, and maple refuse to grow, or only linger miserably. I remember part of a maple avenue, where, year after year, the maples had been replaced over and over and failed; at last, we had recourse to white and black ash; none failed, and they are progressing most satisfactorily.

Tamarack will grow in damp, wet ground; we have succeeded with them where even willows had failed; the value of this timber and knees is too well known to require any comment from me.

Russian Pine (*Pinus Sylvestris*)—In making new plantations, especially from seed, it is no more trouble to try foreign than Canadian seed, and, however strange it may appear, I find it easier to procure the seed of the Russian and the Himalaya than of the Canadian pine. One may find among foreign trees valuable additions to our plantations; such as, I think, the Russian pine, native of the north of Russia. Our climate suits it admirably, and it appears a more vigorous grower than our Canadian white pine. I cannot give any opinion as to the quality of the timber, as they have only been sown in the spring of 1873. They started rather slowly, and their height and thickness are less than those of the black walnuts sown two summers later, in November, 1874; but they are now beginning to take more rapid strides. I measured the season's growth of one of them last year, on the third day of July. It showed twenty-six inches in length, gained in about thirty days, as the buds of the coniferæ do not open much before the beginning of June; the year's growth was already over, and from that moment it only thickened and hardened into wood.

Since the growing season of our trees is so short, we ought to lose no time if we wish to help them along, by thinning, removing useless branches, mellowing the ground, or otherwise; all that ought to be done before June, so as to afford them every chance during the growing month. I think the *Abies Nobilis* or White Fir of Washington Territory is the fastest grower among the Coniferæ.

Poplar—I must beg the indulgent reader to listen to my plea in favour of this tree and not condemn it unheard. I speak of the kind known as Cotton Wood or *Populus Canadensis* (not to be confounded with the Balsam Poplar and Aspen). Its growth is wonderfully rapid; twenty-three years ago, in November, 1858, I stuck in the ground three cuttings; it was my first trial at tree culture. They are now over sixty feet high, one is twenty-five inches in diameter, the second twenty-four inches, and the third twenty-two inches, an average of one inch a year in diameter. In every new plantation, in a country completely denuded of forest trees, and especially in re-wooding our western prairies, I would recommend at the start, a plentiful use of this poplar, without neglecting, of course, more valuable trees. It strikes at once from cuttings, which can be procured and transported anywhere with the greatest ease. Thanks to its rapid growth, it will soon enliven the scenery (as it is a handsome tree), afford shade, shelter the other trees in the plantation and supply timber, not of the first quality, but better than none, until the slower growing trees are ready with their more valuable contributions, and it can easily be cut down when the room it occupies is wanted for better trees. This poplar has been introduced from Canada into France, where it is designated as the "Peuplier du Canada," and considered as a useful and profitable tree.

I must now close this long article. The results of my experiments are nothing to boast of; practical men would have done much better. If I had chosen the soil for the different kinds of trees more judiciously, had not left them much too long without thinning

them, and been able to attend to them in the proper seasons, I am convinced that, as a whole, they would be much finer. At all events, it shows that any one who will take the trouble, can begin the culture of forest trees without previous training. I do not speak of orchards here. Having no School of Forestry in Canada, we must educate ourselves; we have got books written on the subject by eminent and practical men, and we have got, always open before our eyes, the great book of Nature.

TREE PLANTING ON THE PRAIRIES.

By S. M. Emory, Minnesota.

The development of the vast system of railroads throughout the west, is bringing into prominence a scope of country to which the name "empire" is peculiarly applicable.

Our eastern friends, whose journeys have been confined to the country east of the Mississippi, have but a limited idea of the boundlessness of this immmense section.

To the new comer, it is hard to make selection from so much that is deserving and desirous; and the usual distinction made, is a settlement of the question—stock raising or wheat growing. Wheat growers are usually attracted to the Red River Valley, the popular name given to the territory extending from Lake Traverse, on the boundary between Minnesota and Dakota, as a starting point on the south, extending north to Lake Winnipeg, with eastern and western boundaries extending indefinitely into Minnesota and Dakota on either side, embracing, also, nearly all of Manitoba.

Stock growers, on the contrary, find greater attractions, in milder winters and better grazing facilities, in the belt of country lying south of the Red River Valley. Each section presents remarkable inducements in its particular line, and both are equally destitute and equally desirous of the benefits arising from tree planting.

The most skeptical caviller from the east, after having given just and impartial criticism to either of these regions, can only find two tangible points of objection to the country: First, the quality of the water; second, the absence of timber. The first is easily remedied by the use of cisterns, supplemented with ice; the second, by the judicious planting and cultivation of desirable varieties of timber. If this prove successful, it must be done under direction and auspices of horticultural bodies and sound doctrine, and information must be disseminated.

The nurseryman can give the embryo tree the best of care, and can send it forth, a thing of beauty, with his tenderest blessing, but it will certainly come to naught, unless the same intelligent providence and forethought attend it on its perilous struggle for existence, surrounded on all sides by the lower and inferior types of creation.

It is dense and overshadowing ignorance, that so effectually bars progress in horticultural effort; the need and want of timber, fruit and ornamental trees, is obvious.

All are anxious to enjoy, but the usual failure that waits upon their careless ministrations has a decided tendency to deter and discourage any further expenditure of time and money, both on the part of producer and consumer, with this difference however: the producer or nurseryman, usually having his all invested in his business, will not allow total failure to ensue, by the neglect on his part of getting rid of his stock, and thus he shifts the responsibility on the shoulders of the planter where it belongs.

The passage of the United States timber law gave tree planting its real impulse. The action of the Government in this respect is munificent, offering as it does, free of cost, 160 acres of land to the planter, save the small sum incident to the cost of filing papers, and the attendant expenses to the planting and cultivation of ten acres of timber. This inures to the benefit of the planter, and is worth all and more than the actual cost of complying with the requirements of the law. Those claims are eagerly sought, being particularly desirable for non-residents, in the liberality of the law as regards settlement and residence.

Many file, depending on future developments to help them toward a compliance with the law, and it is from these, ignorant of the simplest laws of nature, that the greatest annoyances arise.

Their lands, as a rule, are poorly prepared, and sad lack of judgment is shown in the selection of stock, in planting it, and subsequent cultivation. In many instances absolute lack of cultivation follows, so much so, that in traversing the frontier, when attention is directed to some particularly weedy and neglected plot of ground, the information is vouchsafed that this is Mr. So and So's timber claim.

Men, otherwise intelligent, have been heard to say that the timber law was absolutely inoperative owing to its being an impossibility to successfully grow timber upon the naked prairie; a new version of the old story of the fond mamma, who didn't want her boy to go near the water until he could swim; all this in spite of the fact that in the settled parts of this country, timber is steadily on the increase, in spite of the amount used annually for fuel and other purposes. And it is no infrequent occurrence to exhume from excavation on the prairie, well preserved specimens of timber, giving the best evidence that it formerly existed on all our prairies.

One of the most plausible reasons for the abundance of alkaline deposits, as evinced in the water and other ways, is a heavy deposit of ashes in the soil (?) centuries ago, caused by the destruction of timber by fires. The increase of timber is owing to the suppression of these fires, which in their annual sweep over the country, destroy the season's growth of such deciduous trees as may have sprung up from wind-sown seed.

Two years ago, in making a delivery near Fort Abercrombie, a Norwegian, in company with his wife, called for his bill, in which was a large quantity of cottonwood seedlings. The woman objected strenuously to the goods, giving as her reason, that she did not think they were cottonwoods, as the same things were growing all over their new breaking. Subsequent examination proved this to be a fact; it was "bringing coals to Newcastle."

As a rule these claims are being planted to the quick-growing deciduous trees, as Cottonwoods, Box Elder, Willow, and Soft Maple—all good in their place, but hardly to be chosen as life-time neighbours. These planters are many of them poor, with urgent calls for all the money they can get, and it is not strange that they secure those trees that can be had to the best advantage, financially and otherwise. The islands and low lands of the Missouri furnish the bulk of these trees; and cottonwood seedlings are sold at figures that will hardly pay for count and packing; these, if given anything like a fair chance for their lives, will get out at the little end of the horn, and struggle into some prominence as applicants for public favour; however, at best they are poor in quality for fuel and timber, and their open growing tops offer but little protection from drifting snow.

The White Ash, willow, and Box Elder are of more value to the frontier than the cottonwood. The Lombardy poplar is useless, not being sufficiently hardy to stand the low temperature of the winters. The Soft Maple suffers as a small tree, from the same cause, and after attaining respectable dimensions as a tree, suffers from wind storms, which break the tops badly. The Walnut, Butternut, European Larch, Hard Maple, and White Elm are all within reach, and highly desirable as timber trees.

Many are planting liberally of evergreens. These, with proper care, are flourishing, and are valued as snow and wind-breaks, and also as ornamental trees; their rich deep living green breaking the monotony and desolation of the snow-covered prairies.

The varieties doing the best are in the following order, Scotch Pine, White or Silver Spruce, Norway Spruce, American Pine, Balsam Fir, White and Red Cedar, and Austrian Pine. Their growth in our rich soil, stimulated by good cultivation, is phenomenal.

Before leaving the subject of timber planting, attention should be called to the merits of the Black Oak. This possesses peculiar attractions to those living on the prairie. It is easy to propagate by sowing the acorns, care be taken not to disturb the tender rootlets, during the first season, until they have penetrated into the earth and are well established. They increase in size wonderfully fast, and from their habit of holding their leaves during the winter, are almost equal to evergreens as a shelter-belt a quality by no means to be despised in the blizzard region.

The immense consumption of timber for railway purposes, and the protection of the track from snow drifts, makes it highly important that all railway companies should take an active interest in the planting, and where practicable plant trees themselves sufficient for their own needs. The following papers in reference to this important subject are worthy of attention.

TREE PLANTING BY RAILROAD COMPANIES.

By Franklin B. Hough, Chief of the Forestry Department of the United States.

The freight and passenger traffic of the country having passed in a large degree into the hands of railroad companies with a constant tendency to further increase through all coming time, so far as we can now foresee, it becomes a question worthy of notice, as to how the maintenance of these railroads is likely to affect our future timber-supply, and how far it may be for the interest of the companies owning these roads, to provide for their own wants, by reasonable and sufficient planting. We may also in this connection consider the incidental benefits that may be gained from planting, besides those derived from timber as a material for construction or other use.

We have in the United States, about one hundred thousand miles of railroads. The past affords a record of steady increase, but how long it may continue, or to what limit it may reach, it is wholly beyond our power to foretell. In a hilly country these lines of travel must necessarily follow the valleys, and a road once made will generally satisfy the demand, unless, as in the Mohawk valley, there be an enormous amount of through traffic from great distances beyond. There must, however, come a time, when the country will be supplied, even in level regions where there are no difficulties from grades to overcome. We will, however, take the facts as they are, and without estimating future increase, examine the question of maintenance in the single item of railroad ties, and see what facts show.

The number of ties to a mile ranges from 2,200 to 3,000, and in some cases as high as 3,500. If we assume that they average 2,500 to the mile we have a quarter of a billion in use. They average eight feet in length, and about seven inches deep and eight wide, giving the contents about three cubic feet apiece, or in all six millions of cords. If piled cord fashion, they would form a pile four feet high, eight feet wide, and 4,575 miles long. Placed end to end they would span the earth fifteen times at the equator, or in one line would reach miles beyond the moon.

These wooden ties besides being placed on the ground, partly buried in sand or gravel, and alternately wet and dry, are exposed to great strain and pressure from passing trains, and under these combined influences are always tending to decay, so that in a period ranging from three to twelve years, they must be replaced by new ones. Their durability depends most upon the timber, and much upon the soil and the amount of use. We may take their average life at from five to eight years, and we shall need from 30,000,000 to 50,000,000 new ties a year for maintaining the present railroads of the country in constant use.

The number of ties that can be cut from an acre of wood-land varies exceedingly, but, at 500 to the acre, we shall need to cut over from 60,000 to 100,000 acres every year to meet this demand.

We can scarcely expect trees to grow to the sizes necessary for ties in less than forty years. In some places it would be no more than twenty, and often forty; but taking thirty years as the average we shall need from nearly two millions to over three millions of acres, or from 3,126 to 4,687 square miles of forest to keep up this supply. In Europe, the beech, which we know is very perishable when on the ground, is made to last from nine to twelve years by various methods of preparation either by the injection of sulphate of copper, at the cost of about twenty cents a piece, or by thoroughly creosoting at eighteen cents, or by immersion in a hot solution of sulphate of copper at about eleven cents, or by external carbonization at six cents a piece. The oak, in Europe, is expected to last in use, as railway ties, from twelve to fourteen years. The sap-wood only of the

oak admits of the injection of antiseptic substances to advantage. The pine, when injected, last from ten to eleven years as ties.

Hitherto these methods of preservation have not been much employed in our country, the prices of timber being still so low that it is cheaper to renew them when they decay than to prolong their use by their preparation as in Europe.

A time must surely come when this subject will receive attention, but for the present let us consider the amount of planting required for the maintenance of a supply of ties, and how this can be done with greatest economy by the companies owning these roads.

At the rates we have assumed, there should be from eighteen to thirty acres of woodland for every mile of single track road. Taking twenty-five as a safe average, it follows that there should be somewhere 2,500 acres of forest for the maintenance of every hundred miles of track. This is equivalent to a belt of woodland twelve and a half rods wide along the road, or about three times the width of the right of way.

But woodlands need protection from cattle and from fires. The former can only be got by fencing, and the latter only by vigilance. It would, unquestionably, be cheaper to have these woodlands in a body, or in parcels at convenient distances from the line. It is further to be remembered that railways must run along the valleys where the land is generally rich and high-priced as compared with that in hilly regions, where the timber would grow just as well. In the end, there might not be much difference whether this woodland was owned and cared for by the companies, or whether they bought the ties from those who grew them. There are always other products from a cutting—such as firewood, and in the oak and hemlock, bark for tanning—that may be saved, and always some timber that is worth more for other uses than for ties. We assume that land for this use can be bought for twenty dollars an acre, and at this rate it will need the investment of $500 in land, for every mile of track to maintain a perpetual supply of ties for its use. This is the fixed capital in land, without including the cost of planting and management, nor of cutting or delivery. It will undoubtedly be a wise and proper investment of money on the part of railroad companies, by thus rendering themselves independent for the supply of a material as necessary for their use as iron itself. There will arise, and perhaps may now be found, a class of men who would undertake by contract the planting and care of such woodlands, and this would doubtless prove the most economical mode of management.

With reference to the use of wood by railroads for fuel and for bridges, we are fortunate in finding them both largely decreasing, the former being superceded by mineral coal, and the latter by permanent structures of stone and iron. The tendency will doubtless be much farther in this direction, and with every motive in its favour. In Europe we seldom see a station, or other railroad building, excepting those of brick or stone, and there are no platforms for handling freight, but those of masonry and earth. A shingle-roof is almost wholly unknown and the flooring is very often of brick or stone.

The substitution of other materials for ties is a very different matter. In the early history of railroads in our country blocks of stone were tried, and proved a failure. In India, where the white ants prove destructive to wood, a bedding has been secured by the use of bowl-shaped castings of iron, with the convex side up; and upon some lines in Europe iron ties have been used. Other mineral substances have been proposed, but all of them are much more costly than wooden ties are, and will be for some time to come.

There are other important motives for planting by railroads that we next notice. The consolidation of embankments, and the fastening of the soil upon the slopes that overhang the track, can be done in no way so effectually as by the roots of trees and bushes, and for this use those that have tracing roots, and that are continually sending up sprouts at a distance from the parent tree acquire great value, while they could scarcely be tolerated near cultivated grounds. The erosion of banks by streams can best be corrected by the planting of alders and willows, and the ravines that are so sure to form in light soils, upon steep banks, from rains, are effectually prevented, even by a dense growth of bushes, but better by forest trees.

As to the kinds to be used, and the mode of planting or starting them, everything depends upon the soil, climate, and other circumstances. As a general rule, the Coniferæ, from their liability to suffer from fires, are not desirable near a railroad track, and in some places in Europe, the birch and other deciduous trees are planted along the sides of lines that run through a pine or spruce forest.

There are other cases in which judicious planting may prove of inestimable advantage, as well to railroads as to common highways, in preventing drifting snows. In our northern States and in Canada this becomes in winter a matter of great anxiety to the traveller, and often of vast expense to railroad companies. It may in every instance be alleviated or wholly prevented by judicious planting, especially on the side of the prevailing winds. A single row of deciduous trees will scarcely produce an effect; there should be at least half a dozen rows, and in the more exposed places twice this number, set as closely as may be conveniently grown, to secure full immunity from this cause. A double row of evergreens will generally serve the purpose, but it would still be well in a bleak exposure to have a narrow belt of woodland on the outside to break the force of the storm, and protect the plantation from injury.

So important has this subject proved to be, that the Northern Pacific Railroad in Minnesota and Dakota has undertaken to protect its line at all the cuttings and exposed places for the whole of the distance or as far as it is possible to make trees survive, and with the view of continuing these plantations at places where it is less necessary for the general benefits to be derived from their presence.

Several other railroad companies in the northern and western States have given attention to planting, in some cases for shelter against drifting snows, and in others for the encouragement of settlement, by proving the capacity of the country for the growth of forest trees, in treeless regions on the prairies and the plains.

This subject has in recent years been receiving attention in Russia and other countries, with the most encouraging results.

In these plantations along railroads in a prairie region, it is necessary to prepare the soil for planting, by previously breaking, and afterwards thoroughly and deeply ploughing, and to afterwards cultivate the trees until they have grown sufficiently to shade the ground. It is also necessary to guard against accident from fires whether those that are set by locomotives, or those that sweep over the prairies in the dry seasons, destroying every living thing in their way. The best modes of prevention against these fires, is by carefully burning off the dead herbage and dry materials, selecting for this a time when the fires can be controlled and limiting their spread by a few furrows of freshly ploughed soil. As a country becomes well settled these running fires become infrequent and almost unknown, and the care required in protection grows every year less.

Although there may be infinite advantages derived from ornamental plantations around railway stations, the idea of affording shade to the traveller by avenues along the line presents more points than one for consideration. Along the common highway they become a positive luxury in a hot summer day, as the carriage passes leisurely along under their shade. Is it the same with the flitting shadows on a railway train? Does not the effect become painful to the eyes, and is not the beauty of the scenery lost when the shade is too near, and when there is too much of it? Whoever has travelled in Northern Itlay must have realized this discomfort from the abundance of trees planted, perhaps, partly for ornament, but oftener for use along the sides of the railways. They are far enough apart to afford glimpses of distant scenery—perhaps of marvellous beauty—but in an instant obscured to be the next moment revealed, and so continually till the eyes grow weary and close upon the scenery they cannot enjoy.

TREE PLANTING FOR RAILROADS.

By Dr. John A. Warder, North Bend, Ohio.

Not long ago some suggestions were advanced by the *New York Post*, or the *Nation* newspaper, intended to show how great operations in Forestry might be carried forward by the combination of capital united in joint stock companies. The contributions of many persons, even of limited means, could thus be brought to bear upon the subject effectively, and the company could be enabled to carry forward operations of a magnitude that would be altogether beyond the ability of most individuals to conduct separately, and thus a number of persons could unite in a work, the undertaking of which would be impossible for most of them separately. To grow a forest of any extent, deserving the name, requires a large capital; the land must be purchased and put in order whether we pursue the plan of conservation of the natural growths or by sowing or planting anew. Not only for land, material, and labour, will money be required, and a good deal of it, but the returns will necessarily be slow. The long rotation of most trees put the profits of the harvest beyond a generation of men, hence they who plant can rarely expect to reap. This tree planting, however, is to be a permanent and a sure investment of capital, and being for a while without annual returns, it has little attraction for the poor man, who needs to keep his means in circulation. Like insurance, it is a continuous drain until the trees are established, but when they reach maturity the returns are eminently satisfactory. How many persons constantly bury their capital in the hidden recesses of the earth by taking stock in companies to explore and develope the mines, and wait for many years before the glittering gold appears in the shape of the coveted dividends. But men are led on by hope of the eventual returns.

The forest is a long investment, but a certain and safe depository for our means, where bountiful Nature is ever adding to the capital. The trees are growing while we are sleeping, and a well-managed forest is ever increasing in value, in it the rich lode may be worked continuously, the veins are never exhausted nor cut off, like those of the mine, by "horseback nor fault." Hence the desirability of such an investment, and in the corporation the combined small contributions of the many, in sums that they can spare by using economy, are enabled when thus aggregated to carry on works that would usually be possible only for the rich landed proprietors. Even small amounts of subscriptions to such stocks, aggregating a sufficiently large amount, will enable the company to procure land and proceed with the plantations.

The railways are already incorporated; thanks to the lavish aid of our Government, they are in possession of millions of acres, they hold large principalities of lands just where forests are most needed to meet their own enormous demands for future construction and repairs, as well as to supply the necessities of the rapidly increasing populations which they invite into the country—and just where, for the sake of their influence upon climate, the forests are most required—for it is firmly believed that the disastrous storms, hurricanes and cyclones, that seem to be bred upon those arid regions, or on the mountains beyond them, will at least be greatly modified, if not entirely prevented on the plains, wherever a sufficient amount of the territory in question shall have been covered with trees.

These railroad corporations are wealthy and abundantly able to carry on such works. Years ago, some attempts were made by these Pacific roads, which, however, were rather experimental and intended to prove the possibilities of tree-growing on the plains; but from lack of practical knowledge on the subject by those in charge, and for want of perseverance by the managers of the roads, these spasmodic efforts were abandoned during the financial panic. The Northern Pacific, under the persevering efforts of Mr. Leonard R. Hodges, and the Union Pacific with the enthusiasm of J. T. Allen, sustained by Land Commissioner Burnham, have again undertaken the good work, and within the past two years have been planting groves about the station houses along their lines—even where irrigation was necessary to sustain the trees. Experiments have also been made with

more extensive plantations of trees, which are intended for utility rather than mere ornamentation and comfort.

Some really important work worthy of note has been begun and has reached a degree of success. It was inspired by that noble and intelligent forest advocate and student, Prof. C. S. Sargent, Director of the Arnold Arboretum, near Boston. This refers to planting extensively by contract undertaken by Messrs. Robt. Douglas & Son, of Waukegan, Illinois, with the Missouri River, Fort Scott and Gulf Railroad, and also with a private gentleman of wealth, who is largely interested in the same road, but who has undertaken his planting as a profitable investment. These contracts are of such magnitude as to be of great importance, since they consist of one entire section for the railroad and nearly as much on private account. The data here given en received from private correspondence with the gentlemen engaged in the work, and in part from a Boston newspaper, the *Herald*, which was in direct communication with the other contracting parties and therefore they are quite reliable.

The forest plantation referred to is owned by the M. R. & Ft. Scott & Gulf Railway, and is located at Ferlington, Kansas, in 37.30 North Latitude. The 560 acres planted on private account is four miles further south, both are on high dry prairie. The trees are planted 4x4 feet apart, except the White Ash which are set 4x2 feet. This locality is rather too far west and south for most of our eastern trees, but seems especially adapted to the Catalpa and Ailanthus.

Of the Catalpa, all *Speciosa*, 100,000 planted in the autumn of 1878 and the following spring, with three summers' growth, had reached eight and ten feet, with a diameter of trunk two to two and a-half inches. The 217,600 catalpas planted in the next season, with two summers' growth, had attained the height of four, five and even six feet. Despite the severe drouth of 1881, those planted in 1881, 155,000 catalpas, in one summer, made a growth of eighteen to thirty inches, with the terrible drouth that ruined the grain crop.

In the fall of last year 288,000 were planted, from these the tops were cut off above the collar as they were put into the ground.

The Ailanthus after growing two years had reached six and eight feet with diameter of two inches.

On the other tract the following amounts and acres were set out: Catalpas, 75 acres; Ailanthus, 40 acres.

White Ash, 60 acres, set two by four feet, which required 326,400 plants, making a total of 530,400 trees planted. This plantation was continued during the current season.

The catalpa plantation of 4x4 feet has been easily cultivated and has required no pruning. The trees that have three years' growth, required little care the third summer, and pruning can be entirely dispensed with. The tops shade the ground and prevent the growth of weeds; they are very uniform in size, so that they will stand 2,500 to the acre of contract size four to six feet.

In his letter, Mr. Douglas adds this item which will be of interest to the private planter: "From our past experience with this tree we think, in the case of farmers planting (the cost of trees being an object) they might be planted 6x8 feet with a hill of corn between the trees and a row of corn between the rows, this would require 680 trees, and would allow 2,040 hills of corn per acre. The tall growing corn would have the effect of close planting upon the trees. The corn might be grown three years after which the trees would meet and shade the ground."

The contract is thus described in the Boston *Herald*: "A Boston capitalist has contracted for the planting of 560 acres of prairie land in eastern Kansas. This contract is made with the Messrs. Robert Douglas & Sons, of Waukegan, Illinois, the largest and most successful raisers of forest-tree seedlings in the United States, and is peculiar and novel in its provisions. They agree, at a certain price per acre,—which would differ, of course, with different conditions and location,— to break and plough the land, prepare it for planting, plant not less than 2,720 trees to the acre, and cultivate these until they shade the ground and so require no further cultivation to keep down the weeds and strong natural grasses. At the end of this time, probably in three or four years, the trees will be delivered over to the owner, one cent being deducted from the final payment

for every tree less than 2,000 to the acre delivered, which must be at least six feet high at the time of delivery. The advantage of this plan, which is the one also adopted by the Fort Scott Railroad, is that the trees will be carefully planted and attended to by experienced men, for whose interest it will be to use the best plants, and to cultivate and care for them in the best manner, so as to be able to deliver the greatest number of trees in the shortest possible time, that they may get quick returns for the money invested in plants, planting, etc. Any plantation in which the trees are six feet high, and in which the ground is so shaded that weeds and natural grasses cannot grow, will require no further attention until the time comes for thinning them out for fence-posts, etc. The plan relieves the owner of the great risk always attending the early years of a plantation, and makes his investment practically safe. This plantation of 560 acres is to consist of 300 acres of the Western Catalpa, 200 acres of Ailanthus, and 60 acres which will serve as an experimental ground on which will be tested trees of several varieties, to be selected by Prof. Sargent, the director of the Harvard Arboretum. The Western Catalpa, a native of the low lands bordering the lower Ohio and the banks of the Mississippi in Missouri, Kentucky and Tennessee, is a rapidly growing tree, easily cultivated, and producing timber which, though soft, is almost indestructible when placed in the ground, and, therefore, of the greatest value for fence-posts, railway ties and similar uses. The Ailanthus will grow with great rapidity wherever the climate is not too cold for it, and in spite of its wonderfully quick growth, produces hard, heavy timber valuable for fuel, ties, cabinet work, or almost every purpose for which wood is used.

It is believed that this plantation will soon lead to the formation of others, both by the railroad companies and by individuals, or corporations chartered to plant and own timber lands in the prairie States. Eventually a great deal of capital will be invested in this way. The returns will be slow, and a man investing thus should consider that he is doing it for his children. But when the returns do come they will be enormous, even at the present price of lumber, and it must be remembered that, before a crop of trees planted now can be harvested, the price of ties and other forest products will be more than double in the Western States. An encouraging fact, and one which shows that public attention is being directed to the importance of providing for the future demand of such things is that the Iron Mountain Railroad Company, which runs for hundreds of miles through a heavily timbered region, and possesses in its own lands some of the finest White Oak on the continent, has also made a contract with the Messrs. Douglas to plant near Charleston, Mo., 100 acres of Western Catalpa as an experiment. They do this because catalpa ties have stood on their road scarcely affected by decay more than twelve years, and because this tree is so valued by the farmers for fence posts that it is already practically exterminated in Illinois, Indiana and Missouri, and so not to be procured for ties, although the Superintendent of the railroad is willing to pay three times as much as for the best White Oak ties. If the planting of trees is good policy for a railroad running through a heavily timbered country like Missouri and Arkansas, it will certainly pay for roads in Iowa, Nebraska, Minnesota and Kansas to do the same.

The conclusion of the reading of Dr. Warder's valuable paper was greeted with loud applause.

Hon. Louis Beaubien did not know much about the Catalpa, but could scarcely believe it was more durable than Canadian cedar.

Dr. Warder agreed that *Red* Cedar was highly durable, but required from one to two hundred years' growth before it was fully developed. Cedar was of slow growth, whereas the Catalpa was of use in two or three years. When you get a catalpa tree of six inches in diameter, you have a post worth planting, but a cedar of the same size grown in the United States, was valueless.

In the paper next submitted will be found some practical suggestions on the growing of forest trees from seed for the benefit of those who may feel inclined to raise their own trees.

HOW FARMERS MAY GROW FOREST TREES FROM SEED.

By D. W. Beadle, of St. Catharines, Ont.

It has occurred to me that there may be farmers who want to plant young trees, either for useful purposes or for ornamentation, and if they want to plant largely may find it impossible to get them in sufficient quantity from nurserymen, who generally confine their cultivation to fruit trees, and have not grown to any large extent forest trees for timber. But these parties can form a nursery of these trees themselves by procuring a small piece of ground and have it especially prepared and well mauured, so that there will be strength in the soil for a few years, and then they can raise whatever kind of tree they want. Seeds of the elm, maple, ash and of the walnut and butternut can be found in almost any part of the Province. The important point in planting seeds is that they should be planted as soon as perfectly ripe. Some of our trees ripen their seeds quite early. The Soft Maples, the Dasycarpum and rubum and the elms, ripen their seeds in June. (Mr. Beadle here exhibited two seedlings of Soft Maple grown from this year's seeds.) These maples ripen their seed in June, and it should be gathered and sown at once so that you can get a tree of considerable growth before the winter season. The seed of the elms should also be sown at once; it should be sown in drills not deeply, but covered very lightly. These small seeds require to be covered with only sufficient earth to keep them moist, and they will produce plants in a very short time, and gain sufficient strength to tide over the cold season. But it is not true of all the maples that they ripen their seed so early in the season. The Sugar Maple ripens its seeds late in the autumn, as well as the Ash-leaved Maple, and unless you wish to sow them in the autumn, you have to preserve them and sow them in the spring. If you are not in a position to sow the seed at once, and wish to keep them till the next spring, they should be mixed with sandy soil and kept damp, yet not so damp as to cause them to germinate, and not be allowed to get dry. In this way you may preserve them with safety. If kept dry in papers some of them will have vitality the following spring, but very many of them will not germinate next season, and the proper way to preserve them is to mix them with moist earth. Now comes the butternuts, chestnuts and walnuts; these all ripen in the late autumn, and in suitable soils, may be planted as soon as gathered, and allowed to freeze and thaw with impunity, as they will not suffer therefrom, but will germinate freely in the spring. But in soils which heave out the nuts under the effect of alternate freezing and thawing, it will be better to mix the seeds with soil in sufficient quantity to keep them moist, and prevent them from moulding, and keep them until spring before planting, or they may be spread out very thin upon the ground, and covered with a sod, in which manner they will keep fresh. It is not necessary that the nuts be subjected to frost, that is a matter of perfect indifference; the important thing is not to permit them to become dry. These trees can be grown in nursery fashion, until they attain sufficient size to be planted where they are to remain, especially the elms, maples and ashes. The nut-bearing trees will make better growth if they be planted in the nut where they are to remain.

The benefits actually resulting to farm crops from suitable shelter by hedges is set forth in the following letter to Dr. Warder, from L. B. Wing, Newark, Ohio.

Dr. Jno. A. Warder:

My Dear Sir,—In conversation with Mr. Chamberlain, I stated that the only wheat I raised in 1881 was upon the ground protected by my hedges. In your note of the 15th to me at Newark you ask me for particulars—they are not extraordinary, but I will give them:—

One prairie field about eighty rods in length was sown in the fall of 1880 with Fultz Wheat. The land had good natural drainage, and the wheat went into the winter with a good growth and healthy appearance. But the only part of it that withstood the severe

winter following was a strip from six to ten rods in width along the west side of the field, where it was protected by a tall *Osage Orange hedge*, and the snow which the hedge had intercepted and lodged upon it.

At harvest this strip yielded about eighteen bushels per acre—the remainder of the field nothing. At corn-planting time we had been tempted to plough up all this strip, but concluded to wait the outcome; but it was never worth cutting.

The value of this protection to the young wheat plants, which secured a partial crop on this occasion, might not be so obvious another year. With a more favourable winter they might be able to get on without it. But the shelter these hedges afford to *farm animals* will commend them in *every* year and in all seasons. I have upon this farm long lines of hedges that will turn any sort of farm stock. Upon the roadside it is kept at a height of four to five feet by *one* annual cutting in April or September. The rest of it has never been cut and most of this is twenty to twenty-five feet in height, with few gaps or weak places.

I never had any patience with the fellows who delight in telling me that my "hedges occupy too much room." When I commenced improving this farm it was *all* room—not a tree or shrub upon a thousand acres; and to-day with twenty acres in orchards, with seven miles of hedges, with a few acres in groves of forest trees, I haven't a single twig too much—*not half enough*—to meet what is an equitable requirement that I should contribute my share toward the amelioration of the climate in winter, for the favouring of rain-fall in summer, and for reasonable forethought and provision for those who are to come after me.

Those who are apparently so covetous of the little ground that my trees and hedges occupy can generally find upon their own farms undrained lands, unbroken and unproductive prairie, much greater in extent, which they have never yet found time to bring to profitable uses. I doubt if I have any land that pays me so well, even now, as that which is occupied by these tall hedges and wind-breaks. I have in mind two fields of twenty and forty acres, each well set in Kentucky blue-grass, their summer growth kept till the frosts came, making a thick soft covering, so that one might imagine that he was "walking upon a feather bed" as he passed over them. Our young Shorthorn steers were taken to these fields at the beginning of winter. The tall thick hedges upon every side enable them to shelter themselves, no matter from what quarter the wind may blow, and they do not seem to realize that

"The melancholy days have come,"

but they apply themselves diligently to the freshest of the blue-grass, and grow fat. This is the 21st day of February, and they have not yet been out of their pastures. Occasionally, upon a stormy day, they have been offered hay, which, for the most part, has been contemptuously rejected. Later in the season we shall give them a daily ration of corn and fresh pasture next summer, and before we realize it they will go upon the market as "export cattle."

Now, my dear friend and preceptor, I am sure you can make it clear to the Convention that this pleasant way of farming is not practicable upon the open prairie *fenced with barbed wire*, and, if you do, it will be my apology for drifting away from the particular subject of your inquiry.

Very truly yours,

L. B. Wing.

P.S. But, my dear sir, after the "Forestry Congress" shall have considered the subject of hedge planting and the extension and preservation of our woodlands upon *climatic considerations*, I hope the members will not fail to express themselves in regard to our national protective duty upon Canadian lumber. It is a strange policy to encourage the mowing down of our own forests by a duty upon logs and lumber brought across the lakes for the use of our people. The theory of protection in general is that it increases home production; this duty *destroys* the home production. Each year's cutting of our pine timber is now well ascertained in its extent, and the time when our supply will be

exhausted is not far distant and can he predicted with considerable accuracy. The profits of this destruction goes to the few men who own our pine lands, and is paid them by the many industries that manufacture and consume the lumber.

We need not flatter ourselves that when we shall have exhausted our own inheritance, and are then compelled to admit Canadian lumber free, that our neighbours will not add to the price of that which we have helped them to preserve, a sum equal not only to the duty which our Government now imposes, but also to the profits added which our land-grant railroads and lumber kings are now able to realize through lack of competition.

The sort of statesmanship which would offer bounties for tree planting, and at the same time restrict the importations of lumber for our own necessities, is as feeble as would be an attempt to preserve to this country the American bison by offering a premium for their propagation in your zoological garden, and at the same time give a bounty for their pelts taken from the herds of the great west.

L. B. W.

In every locality forest trees, in common with all other vegetable growths, are more or less liable to the attacks of injurious insects. In order that tree growers may be enabled to distinguish insect friends from foes, and to know how best to subdue injurious species, the following paper is submitted :

INSECTS AFFECTING FOREST TREES.

By William Saunders, London, Ontario.

The preservation of our existing forests, and the protection of new plantations designed in some measure to re-clothe denuded districts, also the establishment of wooded patches throughout the open prairie sections of the western portion of this continent, are all questions of primary importance to us, affecting as they will the climate, and thus the comfort and well-being of a large present and very large prospective population. The regularity of the crops of cereals and fruits is much influenced by the presence of shelter belts of forest, as these break the winds which would otherwise sweep unchecked over the open country, and by their shelter and shade prevent that rapid evaporation from the surface which so often results in the drying up of rivers and streams, causing drought at a time when moisture is most needed.

One of the influences which seriously affects the growth and preservation of forest trees is insect pests. These creatures, often insignificant in size, make up in numbers what they lack in individual power, and frequently by their depredations cast the shadow of disappointment over the hopes and aspirations of the lover of forest trees. These insidious foes sometimes attack the roots, feeding upon them or boring into them, and thus sap the foundations of the tree's existence ; they burrow under the bark, eating out channels or galleries through the sap wood, and materially interfere with the regular flow of the sap, or by the multiplication of these channels sometimes girdle the tree and cause its death. Some of the tiny hosts attack the smoother bark of the twigs and branches, and puncturing their surface suck the sap, the life-blood of the tree ; others burrow into the terminal shoots and cause their death ; while a large army of invaders feed openly upon the leaves, consuming their substance, and materially retard the growth of the trees they attack.

It would be impossible in a paper like the present one to refer in detail to the individual species composing these vast hordes—such particulars would fill volumes ; hence on this occasion we must content ourselves by dwelling on the general principles which are to guide us in our efforts to destroy these foes. When such destruction is practicable, and where direct human effort seems powerless or too insignificant in its result to be

worthy of trial, we must then endeavour to aid Nature in her efforts to restore the equilibrium, after which she is ever striving, by encouraging and protecting insect friends, which prey on the destructive species, also insectivorous birds and other useful agencies; in short, learn to distinguish our friends from our foes, and strive to protect the former while we destroy the latter.

To make our subject clearer we shall refer somewhat in detail to the habits and peculiarities of some common representative species in each of the departments referred to. As representing the root-boring insects, the broad-necked Prionus, *Prionus laticollis*, which sometimes attacks the roots of apple and pear trees. The sap-sucking insects attacking the root, the apple-root plant-louse, *Schizoneura lanigera*. The trunk borers will be represented by the maple borer, *Glycobius speciosus;* the maple egerian, *Aegeria acerni;* the northern brenthian, *Eupsalis minuta;* the pigeon tremex, *Tremex columba;* and the hickory and walnut borer, *Monohammus tigrinus*. Those which injure the branches, by the hickory twig girdler, *Oncideres cingulatus*, and the woolly louse of the pine, *Coccus pinicorticis*. Of the hosts which attack the leaves, reference will be made to the forest tent caterpillar, *Clisiocampa sylvatica;* the luna moth, *Actias luna;* the lime-tree measuring worm, *Hybernia tiliaria;* the poplar dagger-moth, *Acronycta lepusculina;* the pine leaf-miner, *Gelechia pinifoliella;* the oak leaf-miner, *Lithocolletis hamadryadella;* the white pine saw-fly, *Lophyrus abbotii;* and the hickory aphis, *Aphis caryalla*.

Attacking the Roots.

The Broad-necked Prionus—Prionus laticollis.

This insect bores into the roots of the apple and pear trees, and often injures the roots of grape vines. When full grown it is a very large fleshy grub, from two and a half to three inches long (see Fig. 1), of a yellowish white colour, with a reddish brown head, and a dull bluish line down the back. It eats its way through the centre of the root, and where the root it attacks is not very large, reduces it to a mere shell. It lives in the larval state some two or three years, and then changes to a chrysalis, as shown in Fig. 2, within the root; this change occurring in the summer season, usually towards the end of June.

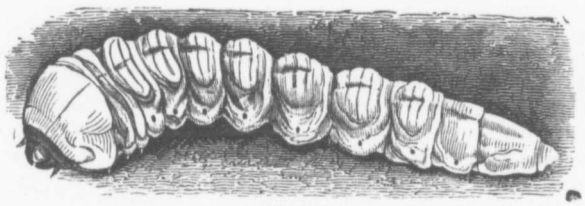

Fig. 1.

Fig. 2.

About the middle of July the beetle appears. It is of a brownish black colour, about an inch and a half long, with strong thick jaws and rather slender antennæ or horns. It is well represented in Fig. 3. Its thorax is short and wide, and armed at the sides with three teeth; the wing-covers have three slightly elevated lines on each, and are thickly punctured. The figure represents a female; in the male the body is shorter and the antennæ longer.

Fig. 3.

The Apple-root Plant Louse—Mytilaspis gromi corticis.

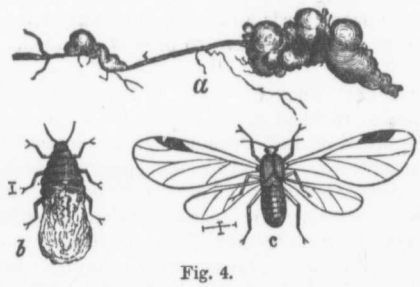

Fig. 4.

This insect works underground, and produces the odd-looking, gall-like excrescences often found on the roots. In Fig. 4, *a* represents an affected root, *b* a wingless louse, and *c* a winged specimen. These enlargements are all caused by minute lice, which may usually be found in considerable numbers in the crevices of the protuberances, where many of them will be seen, of a pale yellow colour, covered with a bluish white cottony matter, and along with these, larger winged specimens. The insects are nourished by sucking the juices of the tree obtained from the tender roots, by piercing them with their beaks.

A species of syrphus fly, known as the root louse syrphus fly, *Pipiza radicum*, preys on these lice, and devours immense numbers of them. In Fig. 5 this useful insect is shown in the larval and chrysalis state, as well as in the perfect condition, all the illustrations being magnified.

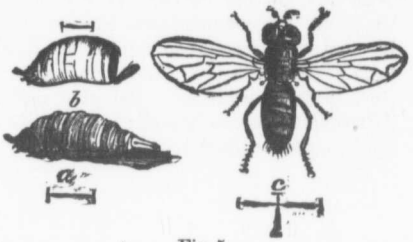

Fig. 5.

ATTACKING THE TRUNK.

The Maple Borer—Clytus speciosus.

This is a very beautiful insect, and may be readily distinguished by its brilliant black and yellow colours, giving it much the appearance of a large hornet, so much so, indeed, that few persons except entomologists care to touch it (see Fig. 6). It is a little over an inch long, and about three-tenths of an inch in width. The head is yellow, and furnished with powerful mandibles or jaws; the eyes and a band above them extending across the head, are black; the antennæ or horns are also black, and are curved somewhat after the fashion of those of a goat, a similarity which gave rise to their general name of *Capricorns* or goat-horns. The thorax is deep black, with two yellow oblique stripes on each side; it is very large, somewhat globular, and flattened or depressed above. The body is deep black, oblong, somewhat cylindrical, a little flattened above, and tapering behind. The elytra or wing covers have yellow bands, the first of which forms a regular arch, of which the keystone is composed of the yellow scutel or little shield-shaped spot at the top of the wings, just behind the centre of the thorax; the second band is in the form of the letter W, each V receiving a termination of the first band; the third band is nearly transverse, and placed across the middle; the fourth is bent obliquely backward, parallel with and near to a large terminal spot or band, which latter has a large black central spot on each wing case.

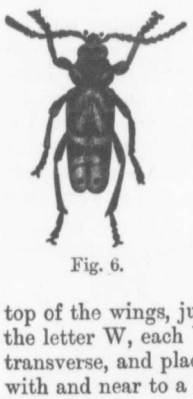

Fig. 6.

The elytra are each tipped with a short blunt tooth. The legs are long and yellow, with a brown line on the inner side of the thighs; they are made for standing securely, being very broad, and with the third joint deeply notched. The underside of the abdomen is reddish-yellow, variegated with brown. Fig. 6 represents the male. The female is larger and stouter than the male, and has rather shorter antennæ. She may also be easily distinguished by having a jointed tube at the end of the abdomen, which is capable of being extended or contracted at will, and is used for the purpose of conveying the eggs into the crevices or holes of the bark of the trees. These insects emit a shrill, screeching

noise on being handled or disturbed. This noise is caused by rubbing the joints of the thorax and abdomen together.

The beetles may generally be seen reposing quietly on the trunks of the trees during the day time, as they are more active at night, which period they select for their excursions in search of their mates. According to Mr. Harris, the bettle lays its eggs on the trunk of the maple in the months of July and August.

The larvæ hatched from these eggs are long, whitish, fleshy grubs, with deeply marked transverse incisions on the body. Their legs, which are six in number, are only rudimentary, and are of no service in locomotion; it is by means of the alternate contraction and extension of the rings or segments of the body that these little creatures force their way through the wooden tunnels in which they live, and in order to further assist their progress each segment is furnished with fleshy tubercles capable of protrusion, and which, being pressed against the sides of their retreats, enable them to thrust forward by degrees the other segments. As the grub has to feed upon very hard material it is provided with strong horny jaws, and the head, which is slightly bent downwards, is also covered with a strong horny skin. The grubs penetrate the bark, under which they lie dormant during the winter, and in the succeeding spring and summer they pierce further in, running long winding galleries up and down the trunk. The larvæ probably remain more than one year in this condition, and then change into pupæ, in which state they are at first whitish and very soft, but gradually harden and darken until the time arrives when the beetle is perfectly matured, and forcing a passage through the outer bark, near which it has instinctively eaten its way whilst yet a grub, emerges into the open air.

This is a very injurious insect, which attacks chiefly the sugar maple. When present they can be readily detected by the sawdust and exuviæ that they cast out of their burrows, and in the spring, whilst still near the surface, it is quite possible to kill them by means of a stout piece of wire, or the judicious use of a good sharp knife.

The Maple Aegerian—Aegeria acerni.

While the borer last described is partial to the sugar maple this species is usually found injuring the soft or red maple. The several stages of the insect are shown in Fig. 7 : *a* represents the larva, *b* the cocoons under the bark, *c* the moth, and *d* the chrysalis forced through the bark.

The moth appears late in May and during June. When the wings are expanded it measures about three-quarters of an inch across; its wings are transparent, decorated with bluish-black markings. The head and palpi are of a deep reddish-orange, antennae bluish-black, thorax ochreous-yellow, abdomen bluish-black varied with ochreous-yellow and terminated by a tuft of brilliant reddish-orange hairs.

The under side of the body is ochreous-yellow with bluish-black markings.

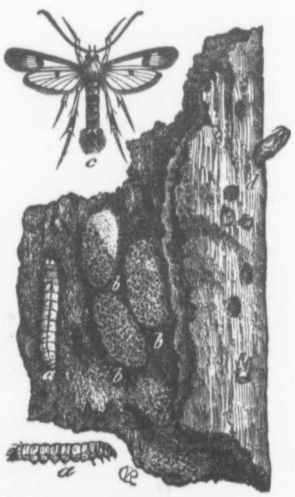

Fig. 7.

The female deposits her eggs on the bark of the soft and sugar maple trees, chiefly on the former, and when hatched the young larvæ burrow through the bark and feed upon the inner portion and sap wood, never penetrating into the solid hard wood. The excavations made by the larva are filled with its brown castings. When full grown it is more than half an inch long, cylindrical to the eleventh segment, then tapering to the end, with the skin wrinkled and folded. The head is small, of a yellow color, cervical shield paler; stigmata brown; legs and tips of prolegs reddish. When the larva is full grown it eats its way nearly through the bark, leaving but a very thin layer unbroken; it then retires within its burrow, and having enclosed itself within a loose, silky cocoon, changes to a brown chrysalis. A short time before

the moth escapes the chrysalis wriggles itself forward, and pushing itself against the thin papery-like layer of bark, ruptures it, and the chrysalis protrudes as shown in the figure. Soon afterwards the imprisoned moth in its struggles ruptures the chrysalis and escapes.

This insect appears to be increasing in numbers every year, and is very destructive, especially to young maple trees.

The Northern Brenthian—Eupsalis minuta.

This insect in the larval state bores into the solid wood of the white oak, forming a cylindrical passage. The larva is about three-quarters of an inch long, (see *a*, Fig. 8,)with a pale yellow head. It changes to a chrysalis *b* within its chamber and appears as a beetle *c* in June and July. This beetle belongs to the family of weevils, but differs from most of them in that its snout projects straight out in front and is not bent under as is the case with weevils in general. The male is very unlike the female, in the figure *c* represents the female, *d* the head of the male ; both sexes vary much in size.

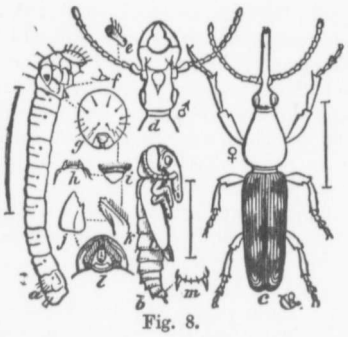

Fig. 8.

The female bores a cylindrical hole with her snout in the bark of the oak and deposits therein one egg which she pushes to the bottom. This shortly hatches, when the young grub works its way into the solid wood of the tree.

The Pigeon Tremex—Tremex columba.

This species belongs to the Hymenoptera or four winged insects. The female is shown in Fig. 9. It is a large, wasp-like creature, measuring, when its wings are spread, an inch and a half or more across. The wings are of a smoky brown colour and semi-transparent ; the body is cylindrical, and about an inch and a half long, exclusive of the borer, which projects about three-eighths of an inch beyond the body ; the head and thorax are reddish, varied with black ; the body black, crossed by seven yellow bands, all excepting the first two interrupted in the middle. The horny tail and a round spot at the base are yellow.

Fig. 9.

The male is unlike the female, is smaller in size, and has no borer. Its body is reddish, varied with black (see Fig. 10), the wings more transparent than those of the female, the body somewhat flattened, rather wider behind. Its length is from three-fourths of an inch to an inch or more, and the wings, when expanded, measure about an inch and a quarter across.

Fig. 10.

The female deposits her eggs chiefly in maple trees, but sometimes in hickory, buttonwood and elm, and also in pear trees. She bores into the bark with her borer, and drops an egg in the hole. The egg is oblong oval, pointed at both ends, and rather less than one-twentieth of an inch in length.

The larva is soft, of a yellowish-white colour, cylindrical in form, rounded behind, with a conical horny point on the upper part of the hinder extremity, and when full grown is about an inch and a half long. It bores deep into the interior of the wood.

The Twig Girdler—Oncideres cingulatus.

Fig. 11.

This beetle has the singular habit of amputating the twigs of the hickory and pear during the latter half of August and early in September. The female which is shown at *a*, Fig. 11, makes perforations in the smaller branches of the tree upon which she lives, and in these deposits her eggs, one of these punctures is shown in the figure at *b*. She then proceeds to gnaw a groove about a tenth of an inch wide, and about a similar depth all around the branch, as shown in the figure, when the exterior portion dies and the larva, when hatched, feeds upon the dead wood. The girdled twigs sooner or later fall to the ground, and in them the insect completes its transformations, and finally escapes a perfect beetle. The beetle is more than half an inch long, of a brownish grey colour, with dull reddish-yellow dots, and a broad grey band across the middle of the wing cases. The antennæ are longer than the body.

The Hickory and Walnut Borer—Monohammus tigrinus.

The larva of this insect bores under the bark and into the solid heart wood of these valuable trees, excavating chambers sometimes to the depth of two feet. The hole runs longitudinally upwards, enlarging as the worm increases in size, being in its largest part about half an inch in width, and a little less in depth. At its upper end it suddenly turns outward through the wood to the bark. Having prepared this outlet for the escape of the insect when it is perfected, the larva retires backward a short distance, and stuffs this upper extremity with its castings, for the purpose apparently of preventing birds like the woodpecker from detecting the burrow by its hollowness, thus showing astonishing instinctive foresight. This artifice is not always successful, for the acute ear of the woodpecker is not easily deceived, and these birds often detect the boring larvæ, drag them out of their retreats and devour them. All the lower portion of the gallery or chamber is filled with the fine powder like castings of the insect which are of a brownish colour. The grub when full grown is about an inch and a quarter long, of a whitish-yellow colour, with a faint interrupted dark line down the back ; body smooth, broad on the anterior segments, tapering towards the extremity ; head black.

Within its mined chamber the larva changes to a chrysalis, and this finally to the beetle, which gnaws its way through the outer bark and escapes. Soon after escaping the beetles pair, and shortly after the female deposits her eggs upon the bark of the trees, and as soon as hatched the young grubs burrow into the wood and begin to destroy it in the manner already described.

The Woolly Louse of the Pine—Coccus Pinicorticis.

This shows itself in the form of a white cottony-like substance, growing upon the smooth bark, particularly below the axils, where the limbs spring from the main trunk, and often small white spots of this same substance are scattered irregularly over the whole of the bark of the limbs, particularly upon the north or shaded side. Trees coated with this substance soon become sickly and stunted in their growth. If a portion of the cottony substance be carefully removed there will be found underneath each tuft, a cluster of small lice huddled closely together and fixed to the bark.

ATTACKING THE LEAVES.

A multitude of insects devour the leaves of forest trees—prominent among these are the following :

The Forest Tent Caterpillar—Clisiocampa sylvatica.

This insect much resembles the common tent caterpillar, *Clisiocampa americana.*

The eggs (*a*, Fig. 12) are laid in clusters, fastened firmly around the small twigs of various sorts of trees, the number in each cluster being usually from three to four hundred. These are placed in position by the moth during the summer, and remain in this condition over the winter, and until the following spring. The young caterpillars hatch about the time of the bursting of the buds, and while small they spin a slight web or tent against the side of the trunk or branches of the tree on which they are placed. In this early stage they often have strange processionary habits; marching about in single or double column, one larva so immediately following another, that when crossing a sidewalk, or other smooth surface, they appear at a little distance like black streaks, or pieces of black cord stretched across. They grow rapidly, and in about six weeks attain their full size, when they are an inch and a half or more in length, (see Fig. 13), of a pale bluish colour, sprinkled all over with black points and dots. On the back is a row of ten or eleven oval or diamond shaped white spots, and on the sides, pale yellowish stripes, somewhat broken and mixed with grey. When about half grown or more, which occurs during the latter part of May, they are extremely voracious, and sometimes swarm to such an extent as to completely defoliate large patches of wooded land, and thus compelling the trees to start a fresh growth of leaves at a critical time during the hot weather, which injures them.

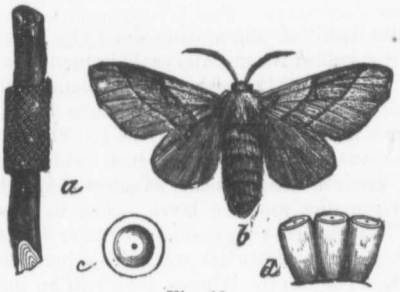

Fig. 12.

When the caterpillar is full grown it spins a cocoon usually within the shelter of a leaf, the edges of which are partially drawn together. The cocoon is whitish-yellow, oval in form, and closely spun with silk intermixed with a pasty substance, which, when dry, becomes powdery, and resembles sulphur in appearance. This cocoon is surrounded by an outer web of silk, loosely woven, and slight in texture.


Fig. 13.

The moths (see Fig. 12 *b*), which appear early in July, are of a pale dull-reddish or yellowish-brown colour, crossed by two oblique parallel lines, which are darker than the rest of the wing. When the wings are spread the male measures about an inch, the female nearly an inch an a half across. After pairing, the female deposits her eggs in the manner already referred to, and shortly after dies.

The Luna Moth—Actias luna.

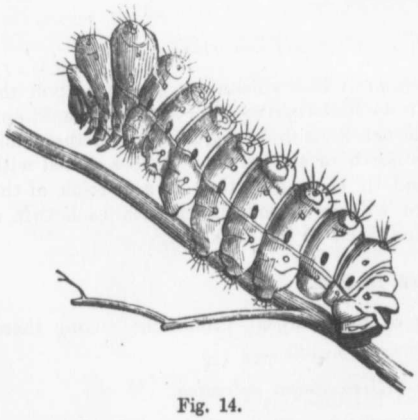
Fig. 14.

The larva of this magnificent moth feeds on hickory, walnut, butternut, and sometimes on beech and oak, and is shown in Fig. 14. It is, when full grown, about three inches long, of a clear bluish-green colour, with a pearly head, and a very pale yellow stripe along each side of the body; the back is crossed between the rings by transverse lines of the same colour. Each segment is adorned with small pearly warts, five or six in number, each furnished with a few short hairs.

When the caterpillar is full grown it draws together two or three leaves of the tree on which it has fed, and within this hollow spins an oval, close and strong cocoon of whitish silk, within which it changes to a brown chrysalis.

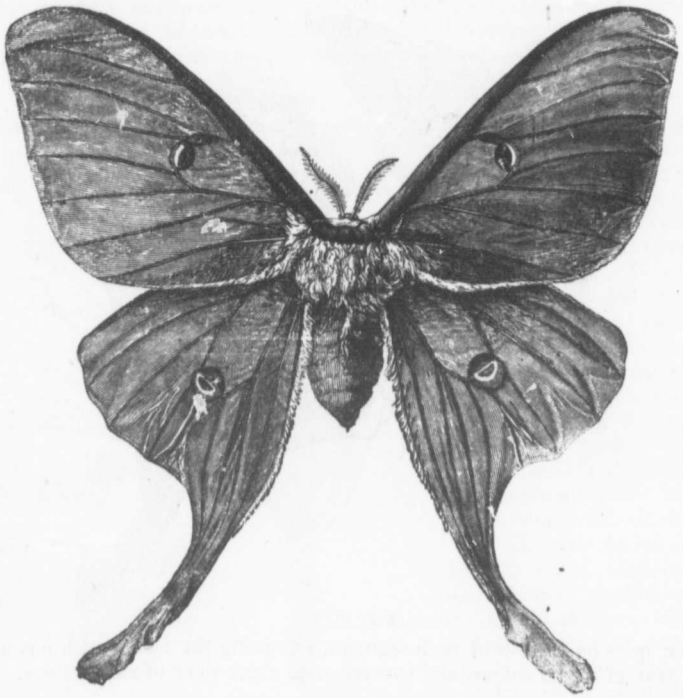

Fig. 15.

The moth, Fig. 15, measures, when its wings are spread, from four to five inches across. The wings are of a delicate green colour, thickly covered with pale hairs as they approach the body. There is a purplish brown stripe along the front margin of the fore wings, which stretches across the thorax, while a small branch of the same is extended to the eye-spot near the middle of the wing. The eye-spots are transparent in the middle, and margin[illegible] with rings of white, yellow, blue and black; the hinder edges of the wings are bordered with purplish brown; the head is white; the antennæ feathered; the thorax thickly clothed with whitish wooly down, and the legs purplish brown.

The Lime-tree Measuring Worm—Hybernia tiliaria.

The larva of this insect is a yellowish looper or measuring worm, with a reddish head and ten wavy black lines along the back. It is shown in Fig. 16 in different positions. It is hatched early in the spring, and completes its growth about the middle of June, about which time it is often very destructive to basswood, elm, hickory and apple trees. When ready for its next change, the larva lets itself down from the tree by a silken thread, and buries itself five or six inches below the surface of the ground, and there changes to a chrysalis, from which the moth usually escapes the following spring, and occasionally some of the moths appear in October or November, but this rarely occurs with us.

The male moths have large and delicate wings and feathered antennæ, as seen in the figure. The fore wings, which measure, when spread, about an inch and a half across, are of a rusty buff colour, sprinkled with brownish dots, with two transverse wavy brown lines and a central brown dot. The hind wings are pale, with a brown dot about their middle.

The female, also shown in the figure, is a wingless, spider-like creature, with slender thread-like antennæ, yellowish-white body, sprinkled on the sides with black dots, and

Fig. 16.

with two black spots on the top of each segment, excepting the last, which has only one. The eggs are oval, of a pale colour, and covered with a net-work of raised lines.

The Poplar Dagger-moth—Acronycta lepus-culina.

The caterpillar of this moth is often very destructive to poplar trees, and more especially to the foliage of the cottonwood tree in the west. It is, when full grown, an inch and a half or more in length, with a black head and its body clothed with long, soft, yellow hairs, from amongst which arise along the back five long pencils of black hairs. When at rest it curls itself up on the leaf, as shown in Fig. 17

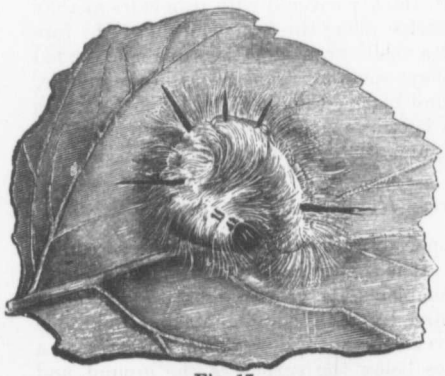

Fig. 17.

Fig. 18.

When full grown the caterpillar spins a pale yellow cocoon of silk, interwoven with its own hairs, hidden in some sheltered spot, and there changes to a dark brown crysalis, from which, in due time, the moth appears.

The perfect insect measures, when its wings are expanded, about an inch and three-quarters across. (See Fig. 18). Its wings are grey, varied with dark brown dots and spots and shadings. Near the hinder angle of the front wings is a rather conspicuous spot, not very distinctly shown in the figure, resembling the Greek letter *psi* placed sidewise. There are two broods of this insect during the year; the moths of the first appear in June, deposit eggs which produce larvæ that reach their full growth, pass the chrysalis

stage, and from which moths emerge about the end of July. The second brood of larvæ are found about the last of August and throughout September, they become crysalids late in the season, and pass the winter in the crysalis state.

The Pine Leaf-miner—Gelechia pinifoliella.

The leaf eaters of forest trees are not all large insects; there are legions of tiny foes, which make up in numbers what they lack in size, and thus inflict serious injury. As a specimen of this class is a minute moth, whose larva lives within the leaf of several species of pine. It may often be observed that the ends of pine leaves, and in many cases the entire leaves above their base, become dead and brown, and when opened are found to be entirely eaten out and to contain, if in the proper season, the larva or pupa of this leaf-miner. Fig. 19 (after Comstock) represents this insect in its various stages, much magnified; the short lines near the figures indicate the natural size. The caterpillar is light brown, narrow, and nearly cylindrical in form, with the head and shield on next segment black. The crysalis is long and slender, of a light brown when first formed, but becoming darker afterwards. The moth is brownish, the fore wings crossed by three white lines, the hind wings pale grey. The moth, when its wings are spread, measures only three-eighths of an inch across.

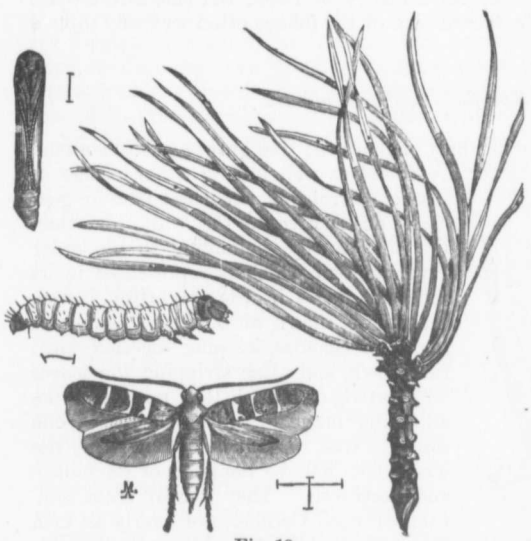

Fig. 19.

The Oak Leaf-miner—Lithocolletis hamadryadella.

This is another very small insect of the same class which injures the leaves of differ-

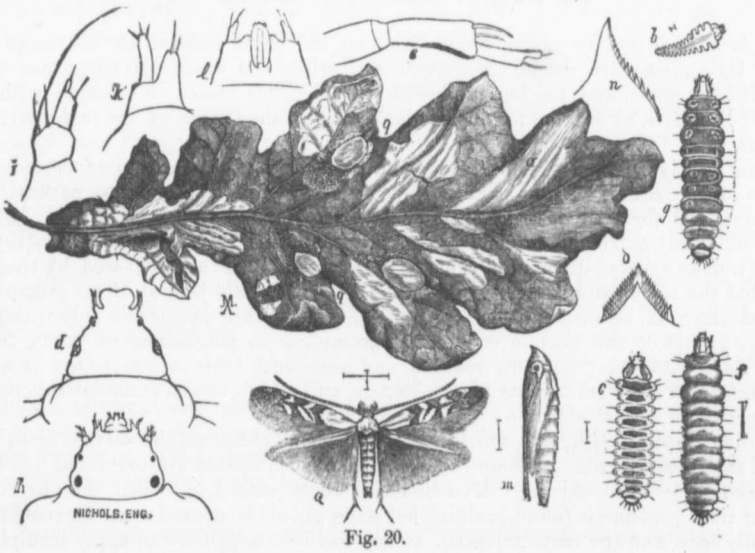

Fig. 20.

ent species of oak. In Fig. 20 (after Comstock) we have an oak leaf represented, covered with blotches. These are of a dull yellowish-white colour, and are caused by the larva of this insect, which lives between the upper and under skins of the leaf and consumes its substance. The young larvæ are shown at *b*, in the figure; *c*, *f*, and *g* represent the larva in the later periods of its growth; *m* the chrysalis and *a* the moth. Although each insect makes but an insignificant blotch on the leaf, yet they are sometimes found in such countless multitudes that almost every leaf has a colony of them, and this interference with the vital functions of the tree by the destruction of the foliage often seriously injures it, and sometimes causes its death.

The White Pine Saw-fly—Lophyrus abbotii.

Moths and their caterpillars are not the only enemies the tree grower has to contend with; foes of the most formidable character are found as well among other orders of insects. Probably, no insect is more generally destructive to the white pine than the pine saw-fly, belonging to the order Hymenoptera, which is represented in its different stages in Fig. 21 (after Riley). The larvæ, shown at *4* in the figure, are found in colonies, keeping together until full-grown, and after stripping the leaves off one twig or branch they pass on to the adjoining branches, until sometimes one side of a tree, or, if it be of small size, the whole tree will be denuded of its foliage and destroyed. They appear from midsummer until October, are nearly an inch long, of a yellowish-white colour, with three or four longitudinal rows of black spots. When mature they form tough, brown, pod-like cocoons attached to the twigs within which the change to a crysalis takes place, from which, in due time, the perfect fly escapes.

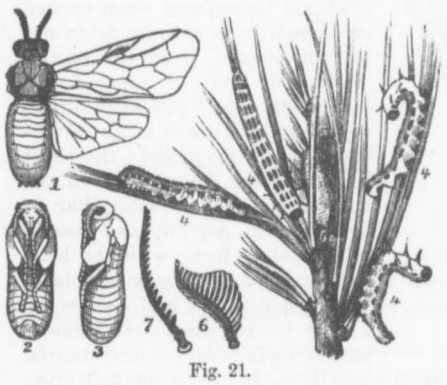

Fig. 21.

The Hickory Aphis—Aphis Caryalla.

This is a small yellow aphis which lives on the under side of the leaves of the hickory. Its antennæ are ringed alternately with white and black, the wings are transparent, without spots, and the legs yellowish white. This insect, in common with all other plant lice, lives by suction; it inserts its beak into the tissues of the leaf and lives upon the sap.

Having briefly referred to some representative species in each group of these insect enemies to forest culture, we now pass to the consideration of the remedies, natural and artificial, available for their destruction.

It is obviously extremely difficult, if not impracticable, to undertake to destroy or control by human agency, insects injurious to forest trees. The area covered by them is so great that the labour and expense connected therewith would be out of all proportion to the good likely to be accomplished. Artificial remedies are applicable only to street trees, small groups on the lawn or ornamental ground, or to plantations of young trees, where the depredators may be easily reached, and since such trees or groups are in most instances esteemed as of great value by the owners, and are objects of constant solicitude, they are worthy of special efforts for their preservation.

It is difficult to reach insects which make their home either on the surface or in the interior of the roots of trees. Where the presence of such insects are suspected, the surface soil should be removed and the superficial roots examined, when if convincing evidence of their presence is found, scalding hot water should be poured upon the roots thus laid partially bare, and the earth replaced. It has also been suggested to apply bisulphide

of carbon, a volatile fluid of a very nauseous odour, by first making holes in the ground by means of a crowbar, and pouring therein a little of this fluid, then closing the aperture and confining the liquid, which slowly vaporizing finds its way into the porous soil around it, for a considerable distance. This liquid has been used for the Phylloxera on the grape roots in France, and it is claimed, with much success.

Borers in the trunks of trees may be detected by the little heaps of sawdust-like castings, which are thrust out of the holes at the extremity of their burrows. Where such are seen, the culprit should be searched for and destroyed with a knife or by thrusting a pointed wire into the orifice. As a preventive measure, the trees should be coated early in June with an alkaline mixture, made by mixing a cold saturated solution of washing soda with soft soap, until the soap is reduced to the consistence of paint. This should be freely applied with a brush, from the base up to the crotch of the tree, and along such of the larger branches as may be within reach. If this is applied during dry weather, it will dry and form a coating not easily removed by rain. The parent insects avoid depositing their eggs on trees so protected, since the alkaline coating is distasteful to them, and would probably destroy any young larvæ hatching from eggs placed on it. As most of the perfect insects of borers appear during June and July, if this application is made early in June, and repeated in three or four weeks afterwards, the trees to which it is applied will be efficiently protected.

For the destruction of insects on the external surface of the bark, a similar alkaline wash would prove an efficient remedy.

All insects which devour the leaves of forest trees may be destroyed by syringing the foliage with water to which Paris green has been added, in the proportion of one or two teaspoonfuls of the powder to two gallons of water. If the Paris green be of the best quality, a teaspoonful to two gallons would be sufficient. It should be well mixed, and being a strong poison, care should be taken after using it to thoroughly cleanse the vessels in which it has been mixed, before using them for any other purpose. Powdered hellebore, which is not so very poisonous, may also be employed to advantage for the same purpose, by mixing an ounce of the powder with two gallons of water.

Where insects attack the terminal twigs of trees, and burrow into their substance, they can be destroyed by cutting off the infested twigs and burning them. Plant lice on the leaves of trees may be destroyed by syringing with strong tobacco water.

It is, however, to Nature's remedies that we must look mainly for relief, especially where large groves of forest trees are invaded. There are a vast number of insects which have been specially fitted to prey on other insects, and it is to them that we must mainly look for aid in subduing noxious species. Since their habits and modes of life vary greatly, we must, to make the subject clear, go a little into detail here.

Fig. 22.

Fig. 23.

Fig. 24.

First, we have the sand beetles, or tiger beetles, as they are sometimes called, *Cicindelidæ*, (represented by Figs. 22 and 23,) which are very active creatures, devouring whatever defenceless insect life may fall in their way. The beetles, of which we have a number of species, lay their eggs on the ground, and the larvæ, which are odd-looking humped-backed creatures, excavate for themselves small cylindrical holes in the earth of such a calibre that their large dull bronzy heads will just fill the orifice. They never leave these excavated chambers in search of food, but crawl to the surface and there place their heads in position, in such a way that the hole is exactly filled, and there patiently wait until some unwary insect strays within their reach, or walks over their heads, when the jaws suddenly open, the unsuspecting victim is seized, dragged down the hole and devoured at leisure. (This larva is represented by Fig. 24.) When the larva is full grown it changes to a chrysalis under the ground, from which, after a time, the perfect beetle escapes.

Next in order come the ground beetles, or carabidæ, of which we have in America,

north of Mexico, about 1,100 named species. These vary greatly in size, some when perfect are but little larger than fleas, while others attain a length of an inch and a quarter or more. The members of this immense family are, with very few exceptions, insect eaters in their caterpillar as well as beetle state. In both conditions they are very active, wandering about from place to place seeking whom they may devour. Some apply themselves to this useful work during the day time, while others are nocturnal in their habits. The larvæ of many of them, being soft-bodied and comparatively defenceless, live under stones and logs, or hide themselves in loose earth or rubbish. Every person interested in the destruction of noxious insects should so far acquaint himself with the general appearance of the members of this useful family as to be able to recognize them. The copper-spotted carab, *Calosoma calidum*, is shown in Fig. 25, and the green caterpillar hunter, *Calosoma scrutator*, in Fig. 26 ; these are among the largest and most familiar species. They often climb trees in search of canker-worms, tent caterpillars, and other injurious species, and consume them with great gusto.

Fig. 25.

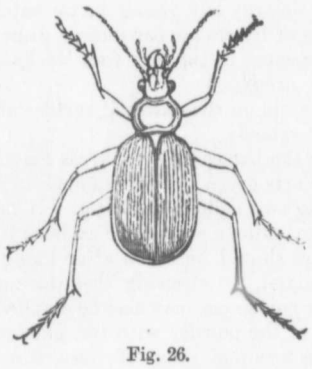

Fig. 26.

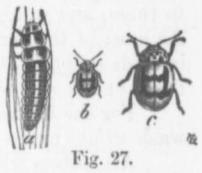

Fig. 27.

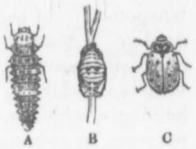

Fig. 28.

A third very useful family of beetles is that of the lady birds *Coccinellidæ*. These nearly all feed on insects, both as larvæ and beetles, and are especially fond of plant lice, *Aphides*. In Figs. 27, 28 and 29 some of our most useful species are shown in the larval, chrysalis and beetle stages, others are represented in the beetle state only, in Figs. 30, 31, 32, 33 and 34. Some of the beetles are known to devour the eggs of the

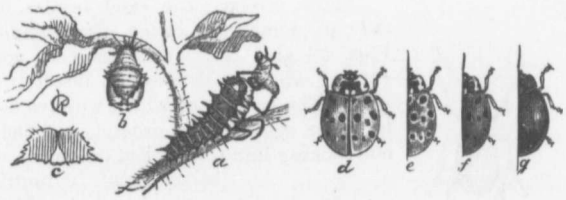

Fig. 29.

Colorado potato beetle, and in all probability they eat the eggs of other destructive insects as well. Were it not for these useful creatures we should soon have our trees

Fig. 30.

Fig. 31.

Fig. 32.

Fig. 33.

Fig. 34.

and shrubs swarming with plant lice, for the powers of reproduction among the plant lice are so enormous that, if unchecked by these active and efficient aids, their numbers would increase to an extent at present inconceivable. In addition to those enumerated, there are species belonging to some other families of beetles which, either in the larval or perfect state, feed on other insects; but the three great families named stand pre-eminently out among the most useful of the insect tribes.

Among the four-winged flies (*Hymenoptera*) we have also many active and useful friends. Some of the larger species of wasps feed on insects, and many of them lay up a store of insects as food for their young. When preparing for the sustenance of their successors these sagacious creatures make cells in the ground, and having placed an egg therein, pack the cells with a sufficient number of insects to sustain the young larva when hatched until it reaches maturity. The cell, when filled, is sealed by the parent, and in this the insect passes through its several stages of egg, larva, and chrysalis, finally escaping from this prison-house a perfect wasp, to continue its useful work. The fraternal potter wasp, *Eumenes fraterna* (Fig. 35), is one of these useful insects. All sorts of soft bodied insects are stored up in these wasp cells, especially caterpillars, and the wasps have the power either of so poisoning their victims that they do not die outright, but remain in a constant state of torpor, or else they inject some fluid into their bodies which preserves them, since they do not, when stored in these cells, undergo decay.

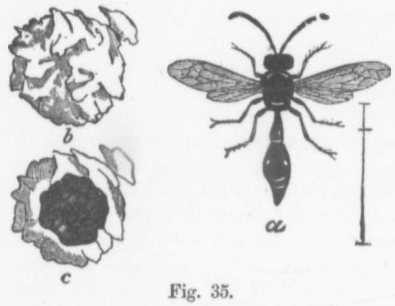

Fig. 35.

A far more important and useful family of insect killers are the ichneumon flies, which belong to the same order as the wasps. These active, sprightly creatures are all day long on the wing, searching everywhere, and prying into every nook and corner for caterpillars, in whose bodies they deposit eggs,

Fig. 36.

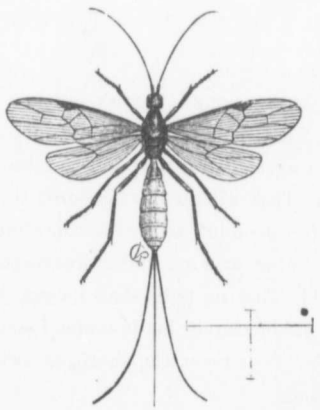

Fig. 37.

puncturing the skin and placing them underneath, where they hatch into tiny grubs, which sustain themselves on the bodies of their victims, avoiding the vital organs, but so weakening the caterpillars that they die either before or soon after passing into the chrysalis condition. In this manner myriads of caterpillars are yearly destroyed, the ichneumon usually changing to a chrysalis within the body of its victim, or spinning a cocoon upon its surface. In Figs. 36 and 37 representatives of this class are shown.

Among the two-winged flies, *Diptera*, we have also our useful allies. The Tachina flies, whose history is very similar to that of the ichneumons, are very numerous, and they destroy immense numbers of caterpillars; Fig. 38 illustrates one of these. The syrphus flies, elegant little creatures with golden bands across their bodies (see Fig. 39), deposit their eggs where plant lice are most numerous, and their larvæ, which are blind, grope around searching for the

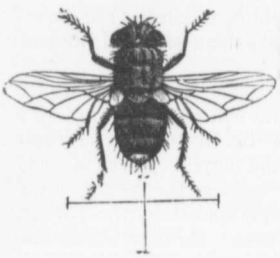

Fig. 38.

Fig. 39.

Fig. 40.

defenceless lice, which they greedily devour (see Fig. 40). The dragon flies, *Neuroptera*, are also worthy of mention, since they are great insect eaters, catching their prey on the wing and alighting to devour it.

Insectivorous birds are also useful helpers, although not so important as insect friends. Nearly all birds feed their young on insects, and hence, during the breeding season, consume large numbers of them, but they devour alike the useful and the injurious, the one as readily as the other, and are not at all discriminating in this important particular. From the observations thus far made it seems probable that birds do comparatively little to keep down injurious insects; that the even balance between the useful and the noxious species, when disturbed by the overdue accumulation of the latter, is set right mainly through the agency of friendly insects. This subject has not, however, been sufficiently studied to enable one to speak positively concerning it. In the meantime let us encourage the insectivorous birds, and do all we can to protect them.

CONCLUSION.

The delegates, in view of the information obtained at the several meetings of the American Forestry Congress, beg leave to make the following recommendations:

I. That such of the public lands as are more suitable for the growing of timber than for agricultural purpose, be retained by Government as a part of the public domain.

II. That within this timbered tract scattered portions be leased to persons suitable to act as forest police, to protect the timber lands from trespass, guard against fires, remove fallen timber, and act under instructions.

III. That no trees shall be cut, whether pine, spruce, hemlock, or hardwood, on any of the public timber lands under fourteen inches in diameter at the stump.

IV. That no cattle, sheep, or swine be allowed to roam at large in any of the public woodlands.

V. That the lighting of fires in or near any woods from May to October, inclusive, be prohibited, under severe penalties.

VI. That a general stock law be enacted, prohibiting cattle, sheep, and swine from running at large in any part of the Province, unless the municipal council of any municipality shall pass a by-law authorizing their running at large within that municipality.

VII. That encouragement be given to farmers to plant timber lots of not less than ten acres on each farm of one hundred acres, and maintain the same as a timber lot, from

which cattle must be carefully excluded. Such encouragement may be given by exempting the timber lots from taxation so long as the same are maintained and properly cared for.

VIII. That encouragement be given to farmers to plant and maintain shade trees along the public highways and the boundary lines of farms, by granting out of the Provincial treasury, a sum of ten or twelve cents for each tree so planted and maintained in a healthy and growing condition for a period of five years, provided the municipal council of the municipality in which they are growing shall have granted a like sum.

IX. That hereafter it be a condition in all sales or grants to settlers, that not less than twenty-five acres in every hundred shall be forever kept as woodland, under penalty of forfeiture of the whole, and that the covenant be made to run with the land.

X. That scientific and practical instruction in forestry be given to the students at the Agricultural College.

XI. That a competent conservator of forests be employed, with a sufficient staff, and clothed with adequate powers to see to the proper execution of all laws relating to the cutting of timber, lighting of fires, running at large of animals, etc., etc., within the timber lands of the Province.

XII. That as soon as practicable the management of the public forests be assumed by the Government, and all timber be cut and sold, trees planted, pruned, and cared for, and all matters relating thereto be conducted under the supervision of a chief forester.

XIII. That the grounds of the several public institutions be utilized as far as practicable as experimental stations, by planting thereon timber trees that promise to be of practical value, and testing their adaptation to these several localities.

XIV. That Government cause accurate maps to be made of each County, shewing the area that has been cleared off, that has been destroyed by fire, and that is yet covered with timber, and indicating as far as practicable the quality of the standing timber.

XV. That a forest of acclimation be established at the Agricultural College, Guelph, in which shall be planted such forest trees of other countries as may probably become acclimated in this country, and prove to be valuable for economical or ornamental purposes.

All of which is respectfully submitted,

D. W. Beadle,
Wm. Saunders,
Wm. Brown,
P. C. Dempsey,
Thos. Beall.