

ACC. NO. 119422 CLASS MK. RI. 8C16

Pub.

MAY 2.9 1940

Agent

INVOICE DATE

Fund

Notify Send to

PRESENTED Canada - Aineb and Rebource's Dept. - Jands, Parks Exchange and Forest Branch,

BINDING

MATERIAL

BINDER

INVOICE DATE

Cost

McGILL UNIVERSITY LIBRARY ROUTINE SLIP





# REPORT

OF THE

# FIRST ANNUAL MEETING

OF THE

# CANADIAN FORESTRY ASSOCIATION

HELD AT

OTTAWA, MARCH 8, 1900

OTTAWA GOVERNMENT PRINTING BUREAU 1900



## OFFICERS.

## HONORARY PRESIDENT,

## HIS EXCELLENCY THE EARL OF MINTO, GOVERNOR GENERAL

#### PRESIDENT,

HON. SIE HENRY JOLY DE LOTBINIERE, K.C.M.G., Minister of Inland Revenue, Ottawa.

#### VICE-PRESIDENT,

### MR. WILLIAM LITTLE, Westmount, P.Q.

### VICE-PRESIDENTS FOR THE PROVINCES AND DISTRICTS,

Ontario.—ME. J. B. McWILLIAMS, Peter borough, Ont.
Quebec.—HON. S. N. PARENT, Commissioner of Crown Lands, Quebec.
New Brunswick.—HON. G. G. KING, Chipman, N.B.
Nova Scotia.—De. A. H. MACKAY, Superintendent of Education, Halifax, N.S.
Prince Edward Island.—HON. D. FEBOUSON, Marshfield, P.E.I.
Manitoba.—MR. STEWART MULVEY, Winnipeg, Man.
Assiniboia.—HON. W. D. PERLEY, Wolseley, Assa.
Saskatchewan.—MR. THOMAS MCKAY, Prince Albert, Saskatchewan.
Alberta.—MR. WILLIAM PERCE, Calgary, Alberta.

Athabasea.—MR. F. WILSON, Hudson Bay Company, Ft. Vermilion, Athabasea. British Columbia.—MR. H. BOSTOCK, M.P., Ducks, B.C.

Yukon.-MR. WILLIAM OGILVIE, Commissioner, Dawson, Yukon.

Kcewatin.--The Lieutenant-Governor of Manitoba, Winnipeg, Man.

#### SECRETARY,

MR. E. STEWART, Chief Inspector of Timber and Forestry, Department of the Interior, Ottawa.

ASSISTANT SECRETARY AND TREASURER,

MR. R. H. CAMPBELL, Department of the Interior, Ottawa.

#### DIRECTORS,

MR. HIRAM ROBINSON, Ottawa.

MR. WM. SAUNDERS, LL.D., F.L.S., F.R.S.C., Director of Experimental Farms, Ottawa. MR. JOHN MACOUN, F.L.S., F.R.S.C., Assistant Director of the Geological Survey, Ottawa. MR. THOS. SOUTHWORTH, Director of Forestry, Toronto. MR. C. JACKSON BOOTH, Ottawa. HON. G. W. ALLAN, TORONTO. MR. E. W. RATHBUN, Deseronto.

112



#### PRELIMINARY PROCEEDINGS

The Minister of the Interior, recognizing the importance of the proper management of the timber wealth of Canada and of encouraging its preservation and restoration, in 1899 appointed Mr. E. Stewart, then of Collingwood, chief inspector of timber and forestry.

In entering upon his duties Mr. Stewart recognized the fact that some organization for arousing and educating an interest in the subject would be of great assistance in carrying out the objects for which his office had been created. In view of the success which had attended the work of the American Forestry Association it was thought that ar organization for Canada on similar lines would probably be able to accomplish what was required, and on January 8, 1900, Mr. Stewart sent out notifications to a number of gentlemen interested in timber and forestry, asking them to meet at his office on the 15th of that month for the purpose of considering the matter and deciding what steps should be taken.

of considering the matter and deciding what steps should be taken. At this meeting there were present Sir Henri Joly de Lotbinière, Mr. J. R. Booth, Mr. Jas. A. Smart, Deputy Minister of the Interior; Dr. Wm. Saunders, Mr. Wm Little; Mr. Thos. Southworth, Clerk of Forestry for Ontario; Mr. E. Stewart, Chief Inspector of Timber and Forestry for Canada; Professor Macoun, Assistant Director of Geological Survey; Mr. Wm. Pearce, of Calgary; Mr. T. C. Keefer, C.M.G.; Mr. C. H. Keefer, C.E.; Mr. Mackenzie, of Duck Lake, N.W.T.; Mr. W. T. Macoun, and others.

Mr. Wm. Little was elected chairman, and Mr. E. Stewart secretary.

Mr. Stewart explained the object of the meeting and the steps which had been taken to call it together, and expressed great pleasure at its representative character.

Dr. Saunders gave some account of tree culture at the Experimental Farms. Remarks were also made by Mr. Southworth, Mr. J. R. Booth, who spoke particularly in regard to five ranging, and by Sir Henri Joly.

It was moved by Mr. Smart and seconded by Professor Macoun, that Sir Henri Joly, Mr. J. R. Booth, Mr. W. Little, Mr. T. Southworth, Professor Saunders and Mr. E. Stewart act as a Committee to call a meeting of all persons interested to be held during the month of February in the City of Ottawa, for the purpose of considering the formation of an Association to promote forestry in Canada, the committee to prepare for submission to the meeting a constitution and by-laws and also a programme consisting of addresses on appropriate subjects for discussion at the meeting. This resolution was carried unanimously.

The meeting then adjourned.

#### NOTICES

The Second Annual Meeting of the Canadian Forestry Association will be held at Ottawa March 8, 1901. Arrangements for special meetings may be made by the Executive Committee.

All Membership Fees should be forwarded to the Treasurer, Mr. R. H. Campbell, Department of the Interior, Ottawa. The Annual Membership Fee is \$1.00 and the Life Membership Fee \$10.00.

Life Membership Fee \$10.00. 'Rod and Gun in Canada,' a monthly publication issued by Mr. J. F. Mackay at 603 Craig St., Montreal, has been made the official organ of the Association and the membership fee will include a subscription to that paper. A department relating to Forestry will be regularly conducted therein and it is hoped that the members of the Association will assist in making it as useful and interesting as possible by contributing papers, correspondence or any items of interest. These may be forwarded either to the Secretary or directly to the publisher.

## FIRST ANNUAL MEETING

#### OF THE

# CANADIAN FORESTRY ASSOCIATION

## Held in the Railway Committee Room of the House of Commons, March 8, 1900.

The meeting convened at 10 o'clock A.M., and Sir Henri Joly de Lotbinière was elected Chairman, Mr. E. Stewart acting as Secretary.

Sir Henri stated that a number of Canadians interested in Forestry had been connected with the American Forestry Association, but that there were very few of them left, and it was considered that it was now time to form an Association for Canada, which could use its influence directly on our own people. He explained the steps which had already been taken, leading up to the appointment of a Committee to prepare a Constitution and By-Laws, which would now be submitted to the meeting.

Continuing, the Chairman said: The objects to be served by the formation of a Forestry Association for Canada may be stated as

First: To advocate and encourage judicious methods in dealing with our forests. During the time I was connected with the American Forestry Association, since 1882, they have been trying to induce the Government to preserve the timber lands on the slopes of the mountains and on the headwaters of the great rivers. They had seen the deplorable effects of the destruction of the forests on the Continent of Europe. Professor Fernow and the members of the Forestry Association saw the danger there was to the prosperity of the country if the forests of the Rocky Mountains were destroyed. I am a witness to what they did in order to induce the American Government to take an interest in this question, and they have succeeded in getting laws passed at Washington to ensure the protection of the forests on the headwaters of their great streams. Hundreds of thousands of dollars have been expended in the States, to purchase large extent of lands only fit for tree culture, and to reafforest them, as in the Adirondacks where we can see the terrible ravages wrought by the blind destruction of the forest. Under our system in Canada we keep the ownership of the lands and license out the cutting of the timber under certain regulations, while in the United States they have sold nearly all their forests, except what Professor Fernow and the American Forestry Association have been able to save.

To appeal to the experience of Canada and the results so well known to our own lumbermen. There was a time when the lumbermen, if they heard of Forestry, would turn away in disgust and consider it only a nuisance, but they have begun to find out that it is quite the reverse: Take the question of fires. There has been more valuable timber destroyed by fire than by the axe of the lumberman.

The lumbermen have found out that it is not only with the wish of holding meetings, which only end in the printing of more or less interesting addresses, that such an Association as this is formed for the protection of forests. We can point to the success obtained in guarding the forest against fire to show how much an Association like this can help to accomplish. We have before us a task most interesting, most productive, and if we carry it out with enthusiasm, such as the subject deserves, it must be of real good to the country.

A second object of the Association is to awaken public interest to the dangers resulting from undue destruction of the timber along the sources of rivers and streams. In the Western States, such as Colorado and Montana, the title of their chief forestry officer is, as I remember it, Chief of Forestry and Irrigation. In the reports of these officers they explain that the purpose in view in planting trees is not so much to procure timber and fuel, as to secure fertility in the regions suffering from drought. The roots of trees, leaves, moss, &c., are like a sponge which holds the rain water and prevents it from rushing down on the fertile valleys and converting them into beds of gravel, as has occurred with such destructive effect in the south of France, Italy, Spain, Greece and other southern countries. Let us preserve the trees and the regular supply of water and moisture necessary for fertilization is preserved.

A third object is to consider and recommend the exploration as far as practicable of our public domain and its division into agricultural, timber and mineral lands with a view to direct immigration and the pursuits of our pioneers into the channels best suited to advance their interests and the public welfare. If there is anything important and that ought to have been done generations ago it is this, and we can still do it with our public domain. We can study our own property to discover what it is fit for, ascertain whether in those parts of the country which nature has supplied with a bountiful crop of trees it is better to remove or to preserve When trees are removed we often leave only a barren wilderness. On the them. other hand there are lands with a rich and productive soil. We ought to discriminate, and not to allow the settler on lands unfit for cultivation. On this side of Lake Superior nearly all the land unfit for agriculture is covered with trees which are of real value, and there are many cases where the trees are much more valuable than any crop, even from the good land. It is necessary to draw the attention of the federal and the provincial authorities to the cruelty of sending settlers where the soil is not fit for cultivation, with the result that, after persevering efforts con-tinued for years to save themselves and the fruits of their labour, they are obliged to move and leave large tracts of wilderness which would have been valuable for timber culture It is noticeable that on lands unfit for agriculture, on sandy soil, we often find fine pine forests.

Another object is to promote forest tree planting in the treeless areas of our north-western prairies, and also along the streets and in the parks of our villages, towns and cities. The western prairies suffer from drought, We know that wind is more dessicating and can absorb as much moisture as the sun. I have been in the North-west in the month of August and could not account for the strange sensation felt until I discovered that it was due to the continual wind, without gusts, but making itself felt as a steady current, like that of a river. By planting belts of trees across our land we will break that steady wind that sucks up the moisture off the soil; there is no doubt that one of the most important things to help the North-west farmer is the planting of trees. Undoubtedly there is a capacity for growing trees in the North-west, though it was denied for a long time. At Moose Jaw, at Medicine Hat, Calgary, &c., trees have been planted by the Canadian Pacific Railway Company and are flourishing, and much has been done in this direction by the Experimental Farms under the direction of Dr. Saunders.

Another proposed object is to collect and disseminate for the benefit of the public information bearing on the forestry problem with respect both to the wooded and prairie districts of Canada. After stating what we will try to accomplish, the next thing will be to spread the information, and in order to do so we will have to ask the members of the association for a small contribution for printing reports.

8





We have suggested one dollar as the annual subscription and ten dollars for life membership.

I have explained the purposes of this organization. If you approve of them, if you think it is a work to which you can devote a little of your spare time, which may give you the satisfaction of feeling that you are doing your duty to your country, I hope that we will receive the encouragement which we humbly think that, not ourselves, but the objects we have in view, deserve.

The Chairman then called upon Mr. Stewart to read the constitution and by-laws as prepared by the committee.

Before doing so, Mr. Stewart read a communication from Dr. B. E. Fernow, Director of the New York State College of Forestry, and formerly Chief Forester for the United States, expressing regret that it would be impossible for him to be present, but wishing all success to the association in its efforts.

Mr. Stewart also stated that Mr. Gifford Pinchot, Chief of the Division of Forestry at Washington, who had been extremely kind in furnishing full information to the office here with reference to the regulations and work of his office, had written expressing the hope of being present at the meeting but unfortunately was unable to attend.

Votes of thanks were also passed to the railway companies and to the press for the interest they had shown in the meeting, the railway companies having granted the single fare rate without any guarantee as to numbers and the press having given full notices of the meeting.

Mr. Stewart then explained the steps that had been taken which resulted in the preparation of the constitution and by-laws now to be submitted. For this meeting notices had been sent to senators, members of parliament and all who it was thought might be interested. It was especially desired that all the lumbermen should be present and take an interest in what was being done, and it would be understood that, whether a notification had reached them or not, the desire of those moving in the matter was that every one who wished to do so should feel at liberty to attend the meeting. All the expense so far undertaken had been borne by the Department of the Interior, and the department was ready to assist the association in every way possible.

On motion of Dr. Saunders it was decided to take up the clauses of the constitution and by-laws *seriatim*.

After this business had been proceeded with for some time it was announced that Strathcona's Horse had arrived on Parliament Hill and the meeting was adjourned till twelve o'clock to give those present an opportunity of witnessing the parade and giving expression to their feelings of patriotism.

parade and giving expression to their feelings of patriotism. On reassembling a communication was read by the secretary from Mr. J. F. Mackay, manager of 'Rod and Gun in Canada,' in which it was stated that that publication desired to aid the cause of forestry by adding a department devoted to it, and would be pleased to receive and publish any contribution on that subject from any one interested. Mr. Mackay also stated that if the association desired an officiat organ he would be pleased to have his journal so designated.

The consideration of the constitution and by-laws was then resumed.

In connection with the clause in regard to membership fee Mr. C. E. E. Ussher asked whether the intention was to provide for a paid secretary as he considered that such an officer would be necessary. In reply the chairman stated that Mr. Stewart had consented to act as secretary and that the Department of the Interior, with which his office was connected, would permit him to devote a large portion of his time to advancing the objects and interests of the association. The annual membership fee in the American Association was \$2.00 and the life membership \$100.00. Mr. Stewart also stated that he would be pleased to do all in his power to forward the work of the association and that his department had promised to give him large liberty of action. He also stated that the department had already assisted the preliminary work in many ways and had sent a stenographer to take the report of this meeting for the association.

On motion of Professor Macoun it was decided to make the annual membership fee \$1.00 and the life membership \$25.00 (which was afterwards reduced to \$10.00). After the constitution and by-laws had been considered clause by clause and

amended in some particulars, they were passed as a whole in the following form :

#### CONSTITUTION.

I. The name of the association shall be The Canadian Forestry Association.

II. Its primary objects shall be :-

(1.) To advocate and encourage judicious methods in dealing with our forests and woodlands,

(2.) To awaken public interest to the sad results attending the wholesale destruction of forests (as shown by the experience of older countries) in the deterioration of the climate, diminution of fertility, drying up of rivers and streams, &c., &c. (3.) To consider and recommend the exploration, as far as practicable, of our

public domain and its division into agricultural, timber and mineral lands with a view of directing immigration and the pursuits of our pioneers into channels best suited to advance their interests and the public welfare. With this accomplished a portion of the unappropriated lands of the country could be permanently reserved for the growth of timber.

(4.) To encourage afforestation wherever advisable, and to promote forest tree planting, especially in the treeless areas of our North-western prairies, upon farm lands where the proportion of woodland is too low, upon highways, and in the parks of our villages, towns and cities.

(5.) To collect and disseminate, for the benefit of the public, reports and information bearing on the forestry problem in general and especially with respect both to the wooded and prairie districts of Canada, and to teach the rising generation the value of the forest with the view of enlisting their efforts in its preservation.

#### MEMBERSHIP.

III. Its members shall include all who pay an annual fee of \$1 or a life membership fee of \$10.

#### OFFICERS.

IV. The officers shall include an Honorary President, a President, a Vice-President, a Secretary, an Assistant Secretary, a Treasurer and seven Directors. V. These officers shall be elected by ballot at the annual meeting of the Associa-

tion and serve one year or until their successors are elected. Vacancies occurring during the year may be filled by the Executive Committee.

VI. The officers shall constitute an Executive Committee and five of the same shall be a quorum, and they will appoint a vice-president for each province and for each provisional district of the North-west Territories and also Keewatin. VII. The annual meeting of the Association shall be on the first Thursday of

March, at the City of Ottawa or at such other time and place as the previous annual meeting shall decide, a notice of one month of which shall be given to each member by the Secretary.

11

VIII. Special meetings shall be held at such times and places as the executive may decide, a sufficient notice of which shall be sent to each member by the Secretary

IX. Amendments of the constitution can only be adopted by a two-thirds vote of the members present and entitled to vote, and at the annual meeting of the Association, and a notice of such intended amendment shall be given with the notice calling the meeting.

#### BY-LAWS.

#### PRESIDENT.

I. The President shall preside at all meetings of the Association.

#### VICE PRESIDENT.

II. In the absence of the President a Vice President shall preside at all the meetings of the Association; and in the absence of all of them a President pro tempore shall be elected by the meeting

#### SECRETARY AND ASSISTANT SECRETARY.

III. The Secretary shall keep a record of the proceedings of the Association and of the Executive Committee, and shall be custodian of all documents, books and collections ordered to be preserved.

He shall conduct the correspondence of the Association and shall keep a list of members with their residence and shall notify members of the time and place of meeting of the Association, and in his absence his duties will be discharged by the Assistant Secretary.

#### TREASURER.

IV. The Treasurer shall have the custody of all moneys received and shall deposit or invest the same in such manner as the Executive Committee shall direct and shall not expend any money except under direction or approval of the Executive Committee. The financial year of the Association shall close on December 31, of each year.

#### ORDER OF BUSINESS.

V. At the regular meeting of the Association the order of business shall be that proposed by the Executive Committee and announced by the presiding officer. In the absence of such prepared order of business the following shall be observed :-

1. Calling to order.

2. Reading of minutes.

3. Reading and referring or disposing of letters, accounts, &c.

4. Reports of Committees.

5. Inquiries and notices of motion.

6. President's address.

7. Papers, addresses and discussion by members and others invited by the meeting

Nomination and election of officers.
Unfinished and miscellaneous business.

10. Adjournment.

0).

sts 68-

ra-&c. our ha est

d a ved ree

rm rks

and ect eraion.

em-

resi-

eiaring

ame and

y of nual aber

After the Constitution and By-Laws were passed the Secretary announced that a membership list would be opened and asked those who wished to join the Association to be good enough to sign.

The meeting then adjourned for luncheon.

On resuming at half past two o'clock the Chairman called upon Dr. Bell to read a paper on "Canada's Northern Forests."

## CANADA'S NORTHERN FORESTS.

# By Robert Bell, L.L.D., M.D., F.R.S., Geological Survey of Canada.

The subject of the distribution of the forest trees in Canada east of the Rocky Mountains has come particularly under my attention as I have had the opportunity of traveling much during the last forty years including the north country as Government geologist for these regions. The map here (indicating a large map hanging on the wall of the railway committee room) is a copy of one prepared for one of the London universal exhibitions, showing the northern forests and their distribution. This map has been modified somewhat by later investigations and the most recent record is shown by the map which was prepared in connection with a paper I read before the Scottish Geographical Society in 1897.

Defore the Scottish Geographical Society in 1997. The forests of North America exhibit a variety and grandeur greater than those of any other country or continent in the world. The reason is supposed to be in part connected with the condition of the earth before the glacial period. It is thought that the polar regions had then a climate fitted for most of our forest trees, which were driven south by the gradual advance of the continental glaciers. After the disappearance of the glacier the trees have been working their way northward. Some of the limits already reached are the extreme possible range; others are not. The spread more quickly, while others, such as those that have their seeds in the form of nuts, will travel more slowly, the seeds being few in number and being more slowly distributed. A single poplar might scatter seed over a whole county in a single

year. The general verge of the forest is at present moving southward, both in America and on the Continent of Asia-Europe, but still a number of the trees have not yet had time to reach their northern limits. An example of this is the black walnut, whose present north limit is at the head of Lake Ontario, but it is found to grow near Ottawa and also at Quebec. This is one of the trees with which our chairman, Sir Henri Joly de Lotbinière, has been making experiments near Quebec.

Itenri Joly de Lotoiniere, nas been inaring experiments near quetter. The number of species of trees in North America is larger than in any other similar area in the north. There are 340 species between our northern limit and the Gulf of Mexico. The British Islands have only some fourteen species, and over the whole continent of Europe there are only twenty-five or thirty species. In Canada there are about 120 species, 95 occurring east of the Rocky Mountains and 25 west of that range. As the width of the continent diminishes rapidly to the south we must necessarily have a large number of species there, so that in the north we have large forests with a small number of species and in the south a smaller area with a large number of species.

area with a large number of species. The chief factors in causing a flourishing growth of trees are a suitable climate with a sufficiency of moisture. The variations of the climate in North America admit of a great variety of growth from the conifers in the north to the tropical trees of the Gulf of Mexico in the south.

The northern forests of Canada stretch from Labrador to Alaska, a distance of 3,700 miles, and have an average breadth of 700 miles. Of the trees east of the Rocky Mountains, we have a northern group of 12 species, a central group of 60, a southern of 15, and a western group of 8, making the total of 95 species.





In our North-west Territories we have a great triangular prairie and plain country. In its eastern, or prairie portion, there are clumps and bluffs of poplar, but on the plains only a few trees in the deep valleys of the rivers. This triangular region is about 600 miles in width on the international boundary and its apex is near the west end of great Slave Lake. It is bordered principally with poplar, birch, &c., and in the north there is a considerable proportion of coniferous trees.

In the area of our northern forests we have a region about forty-four times greater than England, which is 59,000 square miles in extent.

From Ottawa to James Bay is about 600 miles and it is about 600 miles further to the northern limit of forests. In Labrador we have an area 1,000 miles wide from east to west by 1,000 miles from north to south, equal to the whole of western Europe mostly covered by timber. On the east side of Hudson's Bay trees grow to latitude 57° North. On the west side of the bay they range to latitude 59° North and continuing north-west in the Mackenzie Basin they reach latitude 68° North, or to beyond the arctic circle.

This sketch of our great forest wealth will show the necessity of some steps being taken to protect and preserve this great inheritance, as well as to ensure the deriving of a proper revenue from this source, and it also shows the necessity for the organization of an association such as the one formed here to-day.

As a result of the climatic conditions the boundaries of some of the trees run in almost parallel lines, although others show great eccentricities. It is not the mean temperature of the year so much as the extremes of heat and cold, proximity to the sea or to the prairie region, former geological conditions, &c., which affect the distribution of the trees.

The white cedar is one of the most peculiar in regard to its limits. The reason why it does not extend further west than the eastern part of Manitoba may be owing to the dryness of the climate. There is, however, a patch on the west side of Lake Winnipeg, near Grand Rapids, which was probably started from seed carried by the Indians. They are fond of lining their cances with the flat branches of the cedar and seeds may have been carried in this way from the eastern side of the lake. Isolated colonies of other species are probably due to the fact that a footing has been gained here and there in advance of the main body. The white cedar is at its perfection in Gaspé and New Brunswick, occurs but little in Nova Scotia, while there is none in Cape Breton or Newfoundland, yet the present conditions are as favourable in the latter as in the former regions. There are no trees along the eastern edge of the Labrador coast, owing to the biting sea air. The islands off our northern coasts are not wooded and we have two triangular areas called the barren lands, one to the north-west and the other to the north-east of Hudson's Bay, but the greater part of the Dominion is well wooded.

In Ontario and Quebec the presence of certain trees is a pretty good indication of climate, but in the West other factors, such as soil and moisture, affect the problem, and the same species does not always grow under the same conditions. For example, in the south some species will seek the coolest situations and in the north the warmest. The white cedar, balsam, white pine, tamarack, white spruce and white birch choose the coolest places in the southern parts of Ontario, while farther north they seek the warmest.

At one time there was a popular notion that the white pine had a very extensive northern range, but in reality it is comparatively southerly in its distribution, being found only in Ontario and Quebec about as far as the divide between James Bay and the southern slope. North of Lake Superior it has been destroyed by fire and has not had time to reproduce itself. It occurs in Newtoundland but not in very extensive forests.

In our northern or spruce forests a bird's eye view of the country would show a 'patchy' appearance, due to the fact that different areas have been burnt over at different times. The white spruce attains its full growth in about 150 years, and there are second-growth patches of this tree of all sizes and all ages up to 100 years or more, together with some of the old forest.

The origin of forest fires in the more accessible regions is usually due to travellers, explorers, miners or settlers handling fire carelessly. Vast amounts of valuable timber have been destroyed in the past in this way and a great deal is still destroyed by Indians and others leaving fire. But I think that the greatest cause of forest fires in the north is lightning, though there may be other causes. One of the most curious of which I have heard is told of in a tradition of the Indians in regard to a fire many years ago in the Lake Temagami district. They ascribe it to the falling of a hot shooting star—quite a possible reason. Other causes may be the spontaneous combustion of pyrites, &c.

an

8.7

ye

ye

W

be

ar

co

01

W

h

b

ce T

t] t]

0

a

0

8

One of the principal reasons for the frequency of fires in the accessible parts of the country is the facility of getting matches. With these, Indians and other travellers are frequently lighting their pipes, making smudges, etc., when they would refrain if they required to strike a light with flint and steel in the old way. Eddy's matches are probably responsible for a geat number of the fires.

I have calculated that about one-third of the country may be considered as brule, that is, under a second growth up to about ten years of age; one-third as intermediate, including trees between ten years of age and upwards; and one-third including trees assuming the character of those of one hundred years or more. As already stated the area of our northern forests may be reckoned as forty-four times as great as that of England. Any one of these 44 parts will produce wood enough to supply the ordinary demands of the present population of Canada, that is, five million people could get what is required for mining, fuel, &c., by taking the timber from a space the size of England and would be able to allow the other 43 equal parts to be in reserve or used for export. Spruce trees grow much more rapidly up to about thirty years than they do afterwards. The addition made between thirty and one hundred years is much slower. The older the tree the slower the increase.

If any proof is wanting of forest fires having occurred in remote times, it is supplied by the post-tertiary deposits, where we find the charred remains of trees. In the Scarboro Heights near Toronto charred wood has been found two or three hundred feet below the surface, and similar evidence has been recorded elsewhere. We have another proof in the habit of the Banksian pine, which requires fire to

We have another proof in the habit of the Banksian price, which requires involved facilitate, if not to continue its reproduction. The cones are exceedingly numerous. They curve inward and adhere closely to the branch. They grow in bunches of two, three or four and will remain on the tree till it falls away with old age. Though it may be true that this is not the only way the seeds escape from the cones, it is certainly the principal means. The cones gape immediately after being scorched and the wind blows the seeds far away from the parent trees. This habit may have been developed like other habits supposed to be accounted for by the Darwinian hypothesis.

Since I published this statement some years ago other observers have noticed that sometimes cones of the Banksian pine were opened without forest fires, but I have since observed that such cases are due to the sickly condition of the trees and especially to the trees being young and with immature cones opened by some untoward condition. Cones on large thrifty trees are closed until scorehed by fire.

This map is not a commercial timber map but a botanical one. Any tree that has its limits north of a given point extends far south, except the Banksian pine, which is mostly confined to the Dominion of Canada. The trees are at their greatest perfection at the centre of their distribution, both as to latitude and longitude.

## DISCUSSION ON DR. BELL'S PAPER.

By request of Dr. Saunders, Dr. Bell indicated on the map the line of northern distribution of the Silver Leaved Maple (*Acer dasycarpum*) which was shown to be near that of the sugar maple, or generally a little south of the Canadian Pacific Railway line in the Lake Superior region. Dr. Saunders stated that he had found *Acer dasycarpum* as far north and west as Portage la Prairie, where it had probably been planted.

#### 14

Sir HENRI JOLY—My observations appear to indicate that the white spruce does not grow as fast as Dr. Bell's experience seems to suggest. I have measured thousands of white spruce logs in the neighbourhood of Quebec and have never found an average more favourable than one inch in diameter in five or six years, so that thirty years would only give five or six inches.

ė

е

r

y

é,

r-

8

18

70

r

tø

ıd

is

8.

90

е,

8.

iť

r-

nd

ve

ed

me re.

nat ne,

est

be

ific

bly

Sir Henri Joly exhibited two specimens of white spruce wood to illustrate his remarks. In these there had been an increase of one inch in diameter in seven years.

Dr. SAUNDERS.—In the Maritime Provinces we have found that the white spruce will reach from ten to twelve inches of timber one foot from the ground in ten years. We have many specimens at the Experimental Farm of which measurements have been taken from time to time, but the climate in the Maritime Provinces is much more moist than in Quebec. The rate of growth of white spruce is a very important point as it is required for pulp, and it is important to know in what time we could reproduce a pulpwood erop in Quebec.

Mr. WILLIAM LITTLE.—This question in connection with spruce is an important one, as that tree is required for pulpwood. It must be borne in mind, however, that the timber grown in the woods is the important matter, not a single tree growing in a garden. We have spruce trees of enormous growth in our garden, but they are all very branchy. It would be impossible to get a thirteen or fourteen foot log out of them.

Hon. W. D. PERLEY.—I can remember a field in New Brunswick which was a pasture when I was a boy and living there, but it is now all grown up and covered with spruce bush—this in about fifty years.

Sir WILLIAM HINGGTON.—The fact should not be lost sight of that the spruce has no definite rate of growth, that the growth depends upon the conditions. I have been planting for years three, four, sometimes five hundred spruce, and within a certain area can tell what trees will grow fast and what trees will grow slowly. Those that are well protected will grow the most quickly. Some grow as much in three years as others in twelve years. I would like to ask Dr. Bell whether he thinks that low elevation has much to do with the growth of trees? Is it more a question of high or low elevation than one of latitude? If a high level plain occurs, is there any abrupt change? Also whether there is any change in the umbrageous character of the leaf due to elevation ?

DR. BELL.—I consider that elevation has a great deal to do with the growth of trees. When a sudden change in elevation occurs there is an equally sudden outting off of trees. As we go north the line of perpetual snow moves lower down. In passing from Lake Superior to Hudson's Bay we lose sight of certain trees in crossing the height of land and after descending on the other side the same trees appear again.

DR. SAUNDERS.-Does increase in elevation help the growth of certain trees?

DR. BELL.—Some grow better on high land, for instance the hard maple in the region north of Lake Huron and the Ottawa river.

DR. SAUNDERS.—The reason I asked that question is because I have found on the Riding mountain at an elevation of 1,800 to 1,900 feet *Populus tremuloides* growing to a great height, while on the lower ground it was of much smaller size.

MR. W. T. MACOUN.-Has the white pine been found growing upon swamp land?

DR. BELL.-It grows on swamp land in some places in Western Ontario, notably in the county of Bruce.

DR. SAUNDERS.—How far north does one go before the tamarack changes its character as to choice of ground? I have seen tamarack in wet ground as far north as the Swan River.

DR. BELL.—The change takes place about the height of land. The absence of trees in Manitoba must be due to some inherent difference in climate. The trees do not stop abruptly on reaching Manitoba, but begin to curve southward east of that province.

DR. SAUNDERS.—Why is it that on the southern banks of the rivers in the West the trees are of considerable size, while on the northern bank they are smaller? Is not this due to fire?

DR. BELL.—I have noticed that the east and west banks also show a difference, the one slope having a better growth than the other. I think it is due to the fact that in the spring, being exposed to the sun on the south facing bank, the sap is forced up early and the first severe night frost bursts the bark and destroys the

DR. SAUNDERS.-We have had apple trees killed at the Experimental Farm before they were large enough to run sap.

MR. STEWART.--I was at the meeting of the Manitoba Horticultural Society lately and Mr. Stevenson there showed specimens of Wealthy and Hibernal apples grown at his place in Manitoba. The apples were well formed and matured.

grown at his place in Manhoon. The appres were well and the trees are growing DR. SAUNDERS.—I know Mr. Stevenson's place well and the trees are growing at an elevation of less than 700 feet. There is heavy wood to the north and west, while the orchard is so surrounded by evergreens that it is difficult to find it.

Mr. Thos. Southworth, Director of Forestry for Ontario, was then called upon to read a puper on "Forestry Progress in Ontario."

# FORESTRY PROGRESS IN ONTARIO.

# By Mr. Thos. Southworth, Director of Forestry for Ontario.

In accepting the invitation to submit a brief statement as to the progress and present status of the movement for scientific forestry methods in Ontario I do so with pleasure for the reason that I consider very satisfactory progress has been made. I am free to admit we have fallen short of the results hoped for by enthusiastic

l am free to admit we have failen short of the reality is bound be borne in mind that it is not advocates of a rational forestry system, but it should be borne in mind that it is not so very long since the time when trees were justly regarded as obstacles by the hardy settler in Ontario, as the shelter and lurking place of wild animals and the dangerous aboriginal inhabitants who resented his coming.

The forest was an enemy to be removed to make room for houses and crops of cereals and grasses. It is not to be wondered at if the early settler in Southern Ontario in his warfare againt the forest was not satisfied with having conquered but must proceed to exterminate. To such an extent was this war of extermination carried that in some of the older counties of the Province less than five per cent of the total area was left in wood and that so scant and scattering as to scarcely deserve the name of 'torest' in its modern meaning.

The labour of clearing a farm in the early days was very severe. The timber was heavy and as there was no market for it, the logs had to be piled and burned, the only return consisting from the 'potash' produced from the ashes gathered from the burned log heaps. Immense trees of black walnut being just as much in the way and of no more value than swamp ash were got rid of in the same way. As sottlement progressed, however, the settler was aided by a gradually increasing market for some of the timber that had to be removed.

Before dealing particularly with the present position of rational forestry in its Before dealing particularly with the present position of rational forestry in its relation to the lands of the Crown in the Province, I desire to refer very briefly to the historical development of the Crown Timber System, at first of Canada and latterly of Ontario.

During the French occupation of Canada the home Government made no provision for reserving any of the timber except oak suitable for vessels, which in the seigniorial grants was reserved for the King, the question of naval supplies hagvin at that early date become important.

When the British took possession of the colony in 1763 very elaborate instructions were furnished to the first Governor, James Murray, as to his administration of the new acquisition. The first thought of the home Government in relation to the forests of Canada was the necessity of preserving the timber for the same purposes which were regarded as of such paramount importance by the French. They appear to have contemplated a more general and systematic method of accomplishing this object than the mere reservation of the timber in the deads, as will be seen from the following extracts from Governor Murray's instructions dated December

10

08

st,

80

stic

s of

ern

tion

ned

h in

ame

ally

n its

ly to

and

pro-

nthe

agvin

ħ,

7, 1763:— 'You are therefore to lay out townships of convenient size and extent in such places as you, in your discretion, shall judge most proper; and it is our will and pleasure, that each township do consist of about 20,000 acres, having, as far as may be, natural boundaries extending up into the country and comprehending a necessary part of the river St. Lawrence where it can be conveniently had.

And you are also to reserve to us proper quantities of land in each township 'And you are also to reserve to us proper quantities of land in each township for the following purposes, viz.: For erecting fortifications and barracks where necessary, or other military or naval services, and more particularly for the growth and production of naval timber if there are any woodlands fit for that purpose.

and production of nava almost it there are any avoid to us that a great part of the 'And whereas, it has been further represented to us that a great part of the country in the neighbourhood of Lake Champlain and between Lake Champlain and the river St. Lawrence abounds with woods, producing trees if for masting for our Royal Navy and other useful and necessary timber for our navy constructions, you are therefore expressly directed and required to cause such parts of the said country, or any other within your government that shall appear on survey to abound with to use your utmost endeavour to prevent any waste being committed upon the said tracts by punishing in due course of law any persons who shall cut down or destroy any trees growing thereon, and you are to consider and advise with our council whether some regulation that shall prevent any sawmills whatever from being erected within your government without a license from you or the Commander-in-Chief of our said province for the time being, may not be a means of preventing all waste and destruction in such tracts of land as shall be reserved to us for the purposes aforesaid.

Twelve years afterwards in 1775, the same views were still entertained by the British authorities. Again the setting apart of pine-bearing lands was enjoined, Guy Carleton, Captain General and Governor-in-Chief of the Province of Quebec and all territories dependent thereon, receiving among other instructions, the following in relation to pine bearing lands :--

'It is our will and pleasure, however, that no grant be made of any lands on 'It is our will and pleasure, however, that no grant be made of any lands on which there is any considerable growth of white pine fit for masting for our Royal Navy, and which lie convenient for water carriage, but that you do cause all such lands to be set apart for our use and proper regulations made, and penalties inflicted to prevent trespasses on such tracts, and the cutting down and destroying the trees

growing thereon.' The regulations of the land office at that time contained no approach to a license system nor any arrangement by which the public should receive any return for the privilege of cutting timber on the Crown domain. Licenses to cut timber were granted by the home Government to the contractors for the Royal Dockyards and these men in addition to filling their own contracts issued permits to colonials to do a general commercial business in this line.

to do a general commercial business in this time. The first great impetus to the Canadian timber trade was caused by the home Government imposing an import duty on foreign timber, while the colonial timber was admitted free. This duty reached its highest point in 1813 when the duty was £3 4s. 11d, per load with an additional duty of 3s. 2d, when carried under a foreign flag. In 1821 a duty of 10s, per load was imposed on colonial timber but it still had

a protection of 45s, per load. The first step towards securing a revenue from the Crown forests in Upper Canada was in 1826 when the monopoly enjoyed by the navy contractors was abo-

lished and anyone was at liberty to cut timber on the ungranted lands of the Ottawa country on payment of a fixed scale of rate to the Crown. In the proclamation of Sir Peregrine Maitland, Lieut.-Governor of Upper Canada, this change was announced. This proclamation is of great historic interest in several particulars. In addition to imposing a rate of timber dues it provided that these dues should be higher in cases where the timber cut would not square more than eight inches.

and

8

The Crown Timber Act of 1849 marks the next important departure and is the basis of the present act. This Act laid down the principle, and it has not been departed from, that a license to cut timber should be issued for one year only, and that in case of renewal the regulations governing cutting might be changed by the government at any time.

The regulations based upon the Act exacted a ground rent of 2s, 6d, per square mile with the provision that if the limit was not worked the ground rent should be doubled. The limit was considered occupied if 500 feet of square timber or 100 saw logs per mile was cut. No charge was made for limits except in the case of two or more parties applying for the same limit, when the commissioner was authorized to award it to the highest bidder at auction.

The auction system was afterwards adopted in all cases of new limits and a fair idea of the increase in value of timber limits may be gained from the fact that at the sale held in 1892 as much as \$17,500 per mile was paid for a limit and that for the pine timber only.

The policy adopted then, and since followed, was to secure for the public revenue as much as possible of the value of the merchantable timber before disposing of the land to the individual settler, and it was a fortunate thing for this country that the land was thus held by the Crown for settlement instead of being sold at a nominal price to the lumberman as was done in the United States and in our own country to a limited extent in the early days.

This policy of disposing of the virgin crop of timber for the benefit of the public and then handing the land over to the settler was all right in the case of good agricultural land, but in time it became apparent that we had extensive areas of land unsuited for general farming, land on which timber formed the most profitable crop that could be grown and in the case of this land our timber and land policy did not prove the most suitable. Aside from its uselessness as farming land the great area of non-agricultural land contains the head waters or sources of all our principal streams and for this reason also should be kept in timber.

Our system of timber licenses has not proven all that could be desired for that part of the Crown lands referred to. Although a timber license is issued only for one year it has been customary to renew it from year to year so long as the licensee desired or until the land was settled. Considerable territory has been under license in Ontario for forty years and over and although the Crown Timber Act only provides for a one year license, continued renewals with the yearly payment of ground rent has led the limit owner to believe he has a vested interest in the property, and to regard his year's license as forming, if not a perpetual, at least an indefinite tenure of the land.

The forest fires that a few years ago almost invariably followed lumbering operations, left large blocks of land denuded of timber and otherwise useless. For a long time it was regarded as beyond doubt that when once the virgin forest was cut away there would be no more white pine, that a forest of white birch, poplar, balsam, and other less valuable trees took its place.

Because of this belief reforestation and tree planting were regarded as synonymous terms. An investigation ordered by the Commissioner of Crown Lands in 1891 convinced the Government that planting these burned areas was impracticable because of the great expense. Further investigation during the past few years, however, has proved the erroneous nature of the former belief, and we know now that in all the eastern part of the province a new crop of white pine is growing on the land from which the original one was removed, and it only requires immunity from fire to secure as large or a larger crop than the original one.

After a forest fire the ground appears to be first occupied with a close growth of poplar, birch, &c, whose light winged seeds give them an advantage, but these are followed in a year or two by pine and spruce that come up in the shade of the deciduous trees, the shade of which clears off the lower limbs of the conifers making the tall clean trunks necessary for timber.

Very few forest fires are so severe as to completely remove all the pine trees capable of bearing seed; there are generally a few trees left here and there, and these in due time seem to seed the burned-over areas. While pines do not yield seed oftener than once in three years, seldom so often, in this regard also the deciduous trees have the advantage.

When this condition became apparent to the Government and the question of future timber supplies was seen to be dependent on protection from fire and settlement of the non-tillable areas, an act was passed authorizing the Government to set aside such areas as permattent forest reserves.

A start has been made on our system of reserves. We have created two small reserves containing about 125,000 acres of cut-over lands, and one of two millions about Lake Temagami containing a very large quantity of pine, and where the lumberman has not yet operated.

V

8,

n

38,

al

at

8e

te

·a-

ay nd

iy-

ds

ic-

rs, ow

on

ity

In the establisher of of forest reserves the weak point in our Crown timber system has become apparent. The land that has been burned over and is still unsettled is for the most part unsuited for tillage and should be placed in forest reserves for the growing of timber for revenue and climatic reasons. The owners of timber limits, however, are anxious to retain these areas in their licenses and the Government has not seen fit so far to cancel them.

Although the amount paid in advance by way of bonus for these limits was based upon the timber standing upon them at the time of sale and no account of subsequent growth was taken yet the lumbermen regard them as an asset. These areas could of course remain under license and still be placed in reserves, but as the province would have to go to considerable extra expense in protecting and caring for them it is felt that the public revenue from future cuttings should be greater than the \$1.25 per 1,000 now charged on timber cut under licenses. Just what arrangements will be finally arrived at in this particular I am not prepared to say, but it is altogether probable that in the near future Ontario's permanent forests will be increased by many millions of acres.

It is perhaps unnecessary for me to say that the timber on these reserves when mature will be cut under scientific forestry methods. I may also state that the timber on the Temaguni Reserve, where the original crop still stands, is not likely to be sold as has been the case on other territory, but after the European system, so far as our circumstances will allow. It was last year patrolled during the summer months by fire rangers, and the number of rangers will be increased this year.

In this connection it may be mentioned that the system of fire ranging adopted in Ontario some few years ago has saved many millions of feet of timber from the flames, and we now feel reasonably safe from large forest fires. Without the presence of fire rangers in the woods during the dangerous months of the year our system of forest reserves would be impossible. The system is about to be extended, and I am of the opinion that it can be made much more effective by being brought more under the direct control of the Commissioner of Crown Lands than it is at present. As Mr. J. R. Booth remarked not long ago, one forest fire occurs now where there were ten a few years ago.

In the other department of forestry in Ontario, what I might call farm forestry, not as satisfactory progress has been made, although the area of wood land in older Ontario is not decreasing at the present time. It is quite true that we are suffering because our lands have been cleared too closely, but it is also true that a great many of our farmers now appreciate the fact, although they have not, except in a few cases, applied the remedy by planting young trees.

Many of the correspondents of the Bureau of Industries in reporting on the fall wheat for the past year, call attention to the fact that where the field was protected ?

by trees on the north and west, preventing the snow from blowing into drifts, the wheat was a good crop, but where not so protected it was a failure. An increasing number of farmers are planting windbreaks for this purpose, but very few are planting trees in mass.

Nursery grown trees are expensive, and the trees usually taken from the forest and transplanted do not succeed. It is difficult to convince most farmers that very small seedling trees are better to plant than saplings. Just what steps the Government will take to induce the planting of trees on farm lands is not yet decided upon.

Government nurseries as in New Zealand have been suggested, and also remission of taxes in the case of wooded lands. I fully expect that the Ontario Bureau of Forestry will be greatly aided in solving the problem by the deliberations of this Association.

Mr. SOUTHWORTH.—There is one question I would like to ask Dr. Bell. What evidence is there of forest fires having been produced by lightning? I have seen trees struck by lightning, but the fire did not usually spread beyond the tree which was struck, being generally extinguished by the rain which followed.

Dr. BELL.—I witnessed one case myself of a fire caused by lightning and have had many cases reported to me by the Indians, Hudson Bay Company's men and others. The cases of fires caused by lightning in settled districts also corroborate the probability of their being so caused in the north. The rain does not always accompany lightning, nor is it always sufficient to put out the fire.

Mr. M. J. BUTLER.—One point I would like to advert to is the manner in which the provinces treat the forests by allowing lands totally unfit for settlement to be occupied by settlers. In some cases there will be only about twelve or fifteen acres of good land on a farm. The settlers often go in for the sole purpose of taking off the timber.

In the investigations in connection with the Ontario Forestry Commission, we found that the growth of spruce in Hastings, Peterborough, north of Lake Nipissing, Algoma. on the height of land, and at the Rainy River, was an average of about one inch of timber in five years. The Banksian Pine was found to be a quicker growing tree. The sections from which the calculations were made were taken three or four feet above the ground. Mr. W. T. MACOUN.—The white spruce is probably the slowest growing tree in

Mr. W. T. MACOUN.—The white spruce is probably the slowest growing tree in our forest. I do not think it makes a growth of more than one-fourth of an inch in diameter in a year. The white pine makes about twice as much. In height the growth is about two feet every year. We have at the Experimental Farm white pines planted in 1889, which were then fifteen inches high, and have now attained a height of twenty feet. The Scotch pine is a tree that may prove very useful. It will succeed on any kind of soil, wet or dry. It makes more rapid growth on the same soil than the white spruce. Its growth is about the same as the white pine.

Mr. Halliday, of the Crown Lands Department, Quebec, expressed on behalf of the Commissioner and Deputy Commissioner their regret at being unable to be present.

The chairman then called upon Professor Macoun to read a paper on 'The Deforestation and Reforestation of the Western Prairies.'

# THE DEFORESTATION AND REFORESTATION OF THE WESTERN PRAIRIES.

# Professor John Macoun, F.L.S., F.R.S.C., Assistant Director and Botanist, Geological Survey of Canada.

I wish to make some statements with which some of you gentlemen may not agree, but I know of what I am speaking and am prepared to support my views,

the sing are

very ernided

mistu of this

v na seet hich

have and orate vays

hich o be icres g off

t one wing four

ee in ch in t the pines sight will same

lf o lo b

The

N

feolo-

y not views,



Avenue of Manitoba Maples (Negundo Accroidea)—Experimental Farm, Indian Head. (By nermission of Dr. Saunders).



and I hope those who may be of a contrary opinion will put forward their view of

any questions that may be discussed. There are a diversity of causes for prairie fires. The time was when a large part of Manitoba was covered with forest, and also immense tracts of Eastern Assiniboia. In fact south of Indian Head, less than forty years ago, there was considerable growth. In places where now there are no trees and where settlers say that trees will not grow, forty years ago they were covered with forests.

I want to corroborate a statement of Dr. Bell's. I saw two prairie fires in 1894 at Crane Lake, caused by lightning. If prairie fires are caused by lightning, Dr. Bell is probably right in saying that forest fires to the north of the prairies are so caused. I have seen three or four thunderstorms succeed one another on the prairie

I was on the prairie before the settlers. I had the privilege of exploring in without any rain. the year 1879 for 2,500 measured miles on the prairie, travelling with carts, and in 1880 between 1,800 and 1,900 miles. At that time the prairie was covered with grass in places and in other places there were many tracts of burnt forest, especially on the edge of what is the prairie now. Beyond Last Mountain before you reach Long Lake we came to the edge of the prairie and we got no more wood for two weeks. But I want to call your attention to one thing we noticed. Coming up from the prairie, south of where Humboldt is now, we saw the first willow bush with a pond in front. What did this mean? It meant that when the prairie fire went around the pond it left a small triangular piece unburned. This was food for thought and further observation. After this I went into the Touchwood Hills, and found they were merely a slightly elevated tract broken up by ponds of water.

On my return to Ottawa, I went to Captain Deville, who had surveyed the 'hills' that year and said, 'The Touchwood Hills have no existence.' mean? They were wooded, while the rest of the country was bare, so that they had an appearace of height which really did not exist. Why was this so? Because in front of the hills a continuous series of ponds of water was found. When the fires came to the ponds they ceased. The whole country was wooded and we called it

At Moose Mountain I found a whole series of ponds on the north side of Moose 'hills.' Mountain that it was impossible to fire. The mountain was a tract of land covered by wood. In later years these ponds have dried up, and the fires have gone in.

In the country south of Battleford all the fires came from the south or southwest. I found that, as the fire came up, the growth on the south or west slope was burnt off, but the north face was heavily wooded. If cold was the cause why should this be the case? The real explanation is that the fires burnt to where it was moist and then stopped. Next year they pushed farther and farther on until from latitude 51° to latitude 54° the land is largely burnt over and the forest either gone or very ragged. It is burned in the same way north of the Saskatchewan, and so with the woods in the Peace River Valley, which I examined in 1872 and 1875.

There are tracts that never produced wood. Wherever alkali is found in the soil the trees do not grow. This alkali is not potash, derived from the ashes of fires, but

The saline lands are not suited for timber. When I was travelling in autumn the is derived from gypsiferous rock. half-breeds would go to a pond and try the water by tasting it. But I would send them directly to one which I knew contained fresh water. found that in the spring of the year, when the ponds were filled, nearly all except the salt lakes, were fresh. The pond has an impervious bottom and in the fall of the year it begins to be salt. In the latter part of August and September the sedges, which remain fresh in the fresh water ponds, lose vigour and change colour where the water is saline. Men who have thought much will make trivial things mean

How do we get humidity? What is the benefit of a forest? What is the diffemuch for them. rence between a country covered with grass and a country covered with forest?

A tree turns out thousands of leaves and has great roots far down in the ground, and the sun is pumping water out of the tree all day long. It is pumping water out

of the depths of the soil and that water for hundreds of square miles in passing into the atmosphere. The cutting off of the forests means that the rainfall will be carried off the soil too quickly and this return to the atmosphere will cease. The atmospheric currents are not interfered with, but are only prevented from taking the humidity out of the soil through the agency of trees. Thus you have the climate suited to the growing of cereals. The humidity received into the air compensates for the want of it in the climate.

In the sub-arctic forest the trees are spruce, white and black; one pine, the Banksian; one balsam, *Avies balsamea*; two poplars, *tremuloides* and the balsam poplar; and tamarack. The north country produces these and no others.

Of the elm tree, which does not grow on the prairie, there is a magnificent specimen occurring fourteen miles north of Regina in the vally of the Qu'Appelle. The elm is a river-bottom tree.

The oak extends from the Maritime Provinces up on to the prairie at Fort Ellice.

The red ash occurs to half way across Assiniboia at the Dirt Hills, four hundred miles west of Winnipeg.

In 1879 the country up to Moosejaw had a sufficient rainfall for the growth of cereals. In all that country there should be no difficulty in re-covering the greater part with a forest of poplar and possibly white spruce. I eliminate the cold and the Chinooks altogether.

Let us consider now the main prairie including the country four hundred miles from Moosejaw to Calgary. Mr. Pearce has solved the problem of tree growing at Calgary and will tell you what he has done. I saw Mr. Pearce's place before he planted trees and can tell how successful he has been.

My report of 1880 showed that this district was not a desert. Where there is a sward there is no desert. How are the trees to be got on? Precisely in the way that they were taken off. I say that cold has nothing to do with the want of success in growing trees, it is the want of water and water only. Two years ago, when I was in the west, a gentleman now deceased, but then Mayor of Calgary, said to me, 'The Chinooks prevent the growth of trees.' I called his attention to a large tree in the valley of the Bow River. I asked why one was killed while another was left. The reason was that one had water and the other had not. When the trees are planted on the prairie and given plenty of water, as has been demonstrated by the success of the efforts of the Canadian Pacific Railway Company at Moosejaw and Medicine Hat, they will grow and thrive. If it can be done in one place it can be done in another.

When at Indian Head in 1891, I saw a dam built over a creek, and, when asked to speak at a gathering in the evening, I told the people that I would like to see them raise a statue to the man who built that dam. There is a dam also at the Experimental Farm at Indian Head, and the trees growing there are proof of the success of a water supply.

In the prairie region west of Moosejaw there should be dams put across the creeks and some spruce and some poplar put in the beds and valleys, and you can then extend in lefinitely. These are conditions that exist wherever there are trees. The trees grow in all the hollows. There must be a snow-catcher and the trees will grow.

The trees must be grown from seed. You take up a tree and cut the tap root and set it down in another place and the drought gets below the root. The almost inevitable result is that the tree withers and dies.

In 1880 we reached Stinking Lake, and north towards the Saskatchewan in some sandhills we discovered twenty-three big poplar trees, none less than one foot in diameter, and not a shrub around them. The conclusion I reached in regard to them was that the sandhills received the water from the air and the trees stayed where the water was, and the fire could not get at them. That satisfied me that neither Chinooks or cold had to do with the matter. u

The Cypress Hills have many perennial streams and these should be dammed and the water utilized. A dam at Cypress Lake should be built in order to make use of the water coming out of the Cypress Hills on the south side.

Did time permit, I might say much more on this important subject.

ty

θ.

вd

er

he

es

he

is ay

88

as

he

he

ed

88

ne

in

ed

he

he

an

in

ed

Mr. William Pearce, of Calgary, then read a paper on 'Tree Culture on the Plains.

## TREE CULTURE ON THE PLAINS.

## By Mr. William Pearce, Calgary, Alberta.

Some few years ago when political gossip indicated that the Hon. Sir Henri Joly de Lotbinière, the honoured convener of this meeting, would probably be appointed Lieutenant Governor of the North-west Territories, the writer of this, together with all others interested in Forestry in the Territories, breathed a fervent wish that rumour would prove reality, believing his occupancy of that position would do very much more to advance the promotion of that branch of science than could be done by any means then in sight; and although our desires were in that instance met with disappointment, I on behalf of everyone interested in Forestry, at least within that portion of the Territories which may be truly termed the treeless area, desire to tender our hearty thanks for the great interest he, together with the other worthy members of the Committee, has taken in the movement in aid of which we have this day met.

It will probably be admitted by all who have given thought to the subject that it is particularly fitting that those who are interested in or in any way represent our treeless areas should take a prominent part in extending thanks for the efforts already made and anticipate confidently the results hoped to accrue from the organization this day attempted, believing, as they most certainly do, that there is no problem of public policy, which if successfully solved would yield richer returns than the foresting of the great treeless portions of the Western plains. Those situated in the areas specially alluded to, concur in this sentiment. No great effort, skill or study is required to reforest those regions once bountifully covered with But the task to create forests where nature has never done so, may, and no doubt does, appear to many as almost an impossibility, except at a cost trees by nature. of time, money and energy that might cause it to be practically prohibitive. Many of us, however, believe the problem capable of successful solution and are rejoiced in the co-operation of this meeting which we trust and believe will undoubtedly lead to a happy and speedy solution of the problem.

On this occasion it is probably better to treat generally on the subject though I would be only too glad to reply to any questions that may be desired, which I may be able to answer, arising out of a considerable personal attempt at tree growing extending over the past twelve years on the treeless plains and a fairly close observation extending over more than twenty.

There are, however, a few points which it might be desirable to emphasize in regard to the forestation of the treeless plains. It cannot be economically and therefore practically done when any portion of the water required for the plant or tree has to be pumped by hand, horse or steam power.

Outside of the parcels hereinafter mentioned it will prove impossible to make trees grow without the artificial application of water. In many years thorough and deep cultivation would be sufficient to produce a fair growth, if coupled with snow fences, thereby concentrating the snow of several acres on one; but there are winters when there is little or no snow and no drifting, and when that is liable to be

followed by a dry summer then the trees must perish. There is usually no material rainfall in spring or autumn. Sixty per cent of the precipitation occurs between May 20 and August 15. Of the balance fully fifty per cent of it cannot be economically saved except by storage works and afterwards applied under irrigation. From the best information readily attainable, taking Calgary, Gleichen, Medicine Hat and Maple Creek as representative of the treeless belt, from the years 1883 to 1894 inclusive the average rainfall of the four points was  $11\frac{1}{4}$  inches. Sixty per cent of that equals  $6\frac{2}{4}$  inches, and if of the balance,  $4\frac{1}{2}$  inches, only one-half can be utilized, then one can rely only on nine inches of moisture obtained throughout the entire year, far from sufficient for tree cultivation.

There may be many situations where water could be economically applied by water or wind power. Nature has been bountiful in its supply of the latter at every point, and at very many in regard to the former. At the same time it is a mistake to suppose that the area embraced within the treeless plain is or need necessarily be devoid of timber. There are very considerable areas scattered all through the region, where, from the surface of the ground water, or moisture therefrom, arising within such a distance from the land surface that the roots of trees can reach it, or from physical conditions, accumulations of snow and reasonable shade, the ground is sufficiently moist to grow trees, and their growth will more rapidly extend than many imagine. The localities mentioned are widely distributed over the region under discussion. If these were all utilized there is no portion of the territories which need be more than ten miles from a sheltering grove and sixty per cent of it not more than one-fourth that distance. The areas so occupied or reserved, in place of in the slightest affecting injuriously any interest at present existent or likely to be, on the contrary would greatly enhance the same. One of the greatest benefits to the public interest would be the setting apart for the purpose indicated of all those parcels so favourably situated, and the sooner it is done the less conflict will there be with private interests as opposed to the public weal.

## IRRIGATION AS A FACTOR IN FORESTRY.

It would never do for one of the irrigation cranks of the Territories to permit an occasion of this nature to pass without directing attention to the value of irrigation to the objects to be promoted by this meeting. It is probably not necessary to more than allude to it on the present occasion. These who have ever seen an irrigated area, and one that requires irrigation is usually treeless, know that irrigation is invariably followed by timber belts.

#### PRAIRIE FIRES.

Though bush fires have done incalculable damage to Canada, prairie fires have and continue to do also an appalling amount of injury. Public attention has not been particularly directed to this point, because the immediate private loss has not been large and few have looked into the matter and formed an estimate of what the condition of the country would be in a very few years if such fires were a thing of the past. That they can be largely, if not wholly prevented, and that without considerable cost, is true. If this society can lend its aid in this respect it would be productive of incalculable public profit. Forestry and fire protection must go hand in hand. The latter might be carried into effect without paying any attention to the former, though the former would be greatly assisted by giving effect to the latter; but the former cannot be given effect to without the latter.

# PROTECTION OF TIMBER IN THE FOOT-HILLS AND WESTERN SLOPES OF THE ROCKY MOUNTAINS.

The extensive and disastrous high water in Central Alberta in June, 1897, and in Northern Alberta in August, 1899, is wholly attributable to the destruction of al an ii-md of, er by yke m, ade, lly ver the of ed, or est tict not not the nout d be and n to the

and on of

CKY



Lake Louise Forest Park Reserve, near Laggan, B.C.

the is to step erat the as a don ing ex co the de re va ta ar of P w is a ti D to the contract of a

the timber of the foot-hills and eastern slopes of the Rocky Mountains. Unless there is to be a repetition of this, each one probably more disastrous than the preceding, steps must be taken to prevent further destruction and also to re-forest very considerable areas. Such can be cheaply done.

#### TIMBER TO GROW.

Until wind belts are created let all energies be concentrated on the growth of the native woods, and when that is accomplished then attempt the growth of such as are desired. The shorter distance trees are transported for planting out, and so done at the proper or most advantageous age, the greater will be the success attending the efforts. On this particular point there is no doubt.

#### CHINOOK WINDS.

Before quitting this subject it may be well to direct attention to an obstacle experienced in the south-west portion of the Territories, viz.: the Chinook winds. The native tree has fitted itself so as to successfully meet and overcome the conditions created by the phenomenally hot winds. Wind belts will protect from the effects of such winds trees which without such would most certainly be

## RE-FORESTATION AS A COMMERCIAL VENTURE.

It is apparent that the more rapidly trees can be grown sufficiently large to be ready for market, the more profitable the venture; of course bearing in mind the value at the place of growth. Soil, climate, rainfall and drainage must be of course taken also into consideration in determining the locations in which such experiments are attempted. On this point it might be well to direct attention to a large portion of the Selkirk Mountain Range, the lower Fraser River, and many points on the Pacific coast and islands in that vicinity. A very large percentage of the areas specified is not of value for ordinary agricultural purposes; but would probably prove highly valuable for the purpose mentioned. Anyone familiar with nature's work in the re-forestation, which, unaided, in fact to some extent greatly opposed, is being carried out along the 'Anadian Pacific Railway across the Selkirks and along the lower Fraser cannot but be strongly impressed with the favourable conditions which there present themselves.

#### MARSHES and SWAMPS.

Can anything profitably be done to render our large marshes and swamps valuable for timber production? The growth at present thereon is of little or no value. Would not drainage render many of them highly productive for timber growth and could not many of them by so doing be rendered profitable for that purpose? When of course the depth of soil is slight or has too great a depth of turf, drainage probably would not effect the object desired.

# THE BEAVER AN AID TO PROTECTION AND PRODUCTION OF TIMBER.

A friend of mine who has devoted a good deal of study to the production and preservation of forests has asserted it would be a first class economic step to prohibit throughout the whole of Canada the destruction of this industrious animal. This could be readily and cheaply investigated and it is probable his conclusions will be found most sound and an effort should without loss of time be made to establish or disprove the same.

26

At this stage in the growth of the Canadian Forestry Association it occurred to the writer that a brief allusion to the various heads and branches of the subject would best meet the end desired. Each topic is worthy of a paper of considerable length. At present the aim probably should be to create a general interest, believing if such can be brought into being a hearty co-operation will be created and the end desired the more speedily attained. As one who should be fairly familiar with the conditions and requirements of the West I would close this by expressing the confident hope that this effort will receive the hearty endorsement and co-operation of all Canadians, particularly those resident or interested West of Lake Superior.

Mr. C. E. E. Ussher, General Passenger Agent of the Canadian Pacific Railway, stated that he came to the meeting rather as a listener than with the object of making any remarks, but he wished to express his interest in the subject of Forestry and appreciation of its importance.

Mr. Stewart read a paper on "Forestry in the North-west," prepared by Mr. Archibald Mitchell, of Macleod, Alberta, who had been Forester for Lord Dunraven and the Earl of Roseberry in the old country.

# FORESTRY IN THE NORTH-WEST.

# By Mr. Archibald Mitchell, Macleod, Alberta.

I do not think it will be at all necessary for me at this time, to touch upon the principles upon which the future forest system of Canada ought to be based. In the face of such a committee, formed for such a purpose, I feel that anything I could face to the corporation, would be altogether unnecessary and uncalled for.

say in that connection would be altogether unnecessary and uncalled for. Upon the existing forests of Canada, then, I will say little, beyond expressing the hope that a thoroughly sound system of forest economy will very shortly be

established. It seems to me that the people of Canada are suffering from a lack of information on this subject. If it only could be placed before them, laying due emphasis upon the necessity for such a system, together with the general principles on which it will be based; I believe we should very soon have it in full working order. Canadians are a business people, and a system founded upon a solid business basis could not but appeal to them and win their approbation.

not but appear to them and win their appropriation. This association, I have no doubt, will speedily accomplish the object for which it has been constituted and Canada will, in a very little while, be in possession of a forest system which will be a splendid monument to posterity of Canadian intelligence and business enterprise.

gence and business enterprise. With regard to the needs of the West, however, perhaps I may be allowed to say a few words, and more particularly with regard to the grazing regions of Southern Alberta and Assiniboia. These regions, it is superfluous to mention, form a magnificent stock feeding area, and the prairies in summer are covered with thousands of cattle and horses. I say summer, advisedly, because, in winter or at least whenever rough and cold weather is experienced, the stock seek the shelter of the river bottoms. They get among the willows there, and congregate in great numbers. Food, naturally, soon gets very scarce, and the animals become quite poor in condition; and in prolonged, severe weather many of the weaker ones die. There is abundance of feed out on the prairie, but the rigour of the climate prevents its being used. When a Chinook wind occurs and the snow is swept off the grass, the eattle will very often refuse to leave the brush, because of the cold north wind, or when they do leave it, th more

all or have and

add ente a sh raisi is st

For orga and upo

tree

hur con apa abo Ha

yes

eas are

abo po to

> er pl th

Cl w in

1:

8]

P Bl

t

it, they do not get far into the good grass before another storm compels them once

more to return to shelter. Now, if there were groups of trees, says, about 30 to 40 acres in extent, planted all over the prairie a few miles apart, all this would be avoided. The eattle would have shelter close beside their feeding gounds, they would never lose in condition, and much pecuniary loss to their owners would be avoided.

and much pecuniary loss to their owner well knows how much such plantations would Every rancher in this country well knows how much such plantations would add to the value of his stock, but the scheme is one which is too large for private enterprise to overtake. Very few ranchers, indeed, have succeeded in raising even a shelter belt around their houses. As a rule they do not know how to set about raising a plantation, and they have little or no time to experiment. Their business is stock raising, and they attend to that.

is stock raising, and they attend to that. It is a scheme for the government to undertake, and as a branch of creative Forestry is well worthy the attention of this association. Perhaps the already organized machinery of the Experimental Farms would be best able to cope with it, and at any rate, their experience would be of the greatest value in furnishing data

upon which to select plauts, &c. And now, a few words with regard to the practical side of the question. The trees planted, would consist of pines (chiefly Black Austrian), spruces and the hardwoods suitable for the North West.

woods suitable for the North West. They would be planted in groups of each sort, say an area of not less than one hundred yards diameter to each group, or, perhaps, the whole of a plantation could consist of one kind of tree. The plants would require to be from two to three feet apart, certainly not more than three confiers would be planted when they were about three years old, that is, two years in the seed bed, and one year transplanted. Hardwoods could be planted as seedlings, but would, in many cases, be better as one year seedlings and one year transplants.

year seedings and one year transmission. The smaller the plants, the greater the proportion of roots and the easier they are handled. There is less risk of their being injured in the lifting. They are less easily blown out of the ground, as their tops are close to the surface, and besides, are much more flexible; and there is always, at least on the flat, a stratum of air about one foot from the ground which is calmer in a storm than the air above it.

The seeding plants would be raised in a situation convenient for such a purpose, and central to at least ten or twelve of the proposed plantations. All the areas to be planted would be ploughed and cropped with oats or other grain. These crops would serve to ameliorate and loosen the surface soil for the later operations, besides providing somewhat to help cover the expenses. After the lifting of the crop, and during the fall, all the plantation grounds would require to be trench ploughed about eighteen inches deep, and left rough over winter. This would loosen the soil for the plants and help to catch and retain moisture for the growing season. This is a most important consideration in Southern Alberta, for the frequent Chinooks melt the snow which simply runs off the surface and by and by finds its way to the rivers and lakes, because the frozen ground will not allow it to penetrate this water and hold it till spring when it would be able to soak away.

In the meantime the plants for each area would be able been transplanted into In the meantime the plants for each area would have been transplanted into lines in the area they were to ultimately occupy. Another crop of grain would be taken off the trenched land, and the plants would be *slipped* in on the stubble in the

spring following. The plants, being already on the ground, much danger from drought during planting would be avoided. The ground being comparatively level and held by the stubble, there would be less risk of the plants being buried in dust, a condition of affairs which must be reckoned with in this country.

There would be little danger of the cattle damaging the plants, as in summer they would not touch them, and in winter, when the grass was under snow, the trees, at first at any rate, would be under the snow also. By and by, when they got above the snow, they would be of size enough to recover any little damage that might be incurred.

ed ot ole ng nd he on-

ay, akand

Mr. ven

the the could

ssing ly be

ormahasis vhich Canacould

which h of a ntelli-

to say athern magninds of enever er bot-Food, dition; adance g used. llvery o leave

Once established, growth would be most rapid. In about fifteen years the plantations would be at least as many feet high.

The drifting snow would be caught by the trees and remain there to gradually melt with the heat of spring. The ground, being then soft, a plentiful supply of moisture would sink into the soil for the use of the trees.

The falling needles and forest mosses would soon absorb and retain large quantities of water. The surplus would run off and help to vivify the grass of the prairie all round the plantations. In fact, it would just be on a great scale what is to be seen in every coulee and scrub patch in the country, the snow would be retained till the ground was soft enough to absorb it. This indeed seems to be the trouble with the so-called semi-arid regions of southern Alberta and Assiniboia. Plenty of moisture falls in the form of snow, but the Chinooks melt it while the ground is frozen. It cannot enter the soil and so it finds its way at last to the rivers, or lies in shallow pools on the surface to be dried up by the first few days of real warm weather.

And another effect the afforestation would also probably bring about. Forests, as is well known, collect moisture from the air, and many additional springs would probably be formed around the woods, a matter of considerable importance, when perhaps for miles no water is available for the cattle except may be a small alkaliimpregnated lake.

And yet another benign effect might result. The retention and subsequent gradual evaporation of increased quantities of water in the district would cause an increase of moisture in the atmosphere, and possibly also an increased rainfall as a result of that; and who can estimate the value of such a blessing to the sun-baked plains of the west. Even this alone would warrant the adoption of this, or some other such scheme as I have here indicated. The experiment, if conducted on a sufficiently comprehensive scale would be a magnificent one, and its execution would be well worthy of the intelligence and enterprise of the people of Canada.

It is not, of course, intended that this paper should indicate in any arbitrary fashion the course to be followed in this matter. It is simply intended to draw attention to what is felt to be a real need in the country, and to point out briefly the general lines on which it may be met. Some such scheme will be of infinite benefit, and in the coming Forest Department of Canada the partial afforestation of this section of the North-west in something akin to the manner indicated will deserve a most worthy place.

Dr. SAUNDERS.—The results of our experiments with the Austrian pine at the Experimental Farms show that there has been no success with them in the West, nor have the hardwoods been successful. The native trees are most satisfactory, especially the Manitoba maple. At the Indian Head Farm we have 120,000 trees, 110,000 of the native matple and the others chiefly elm and ash. They must be grown from seed ripened in that country, or from seed from the trees found occasionally in the district.

Mr. PEARCE.—The results of my experiments with the pine were very good, but the Manitoba maple was not found satisfactory where there were Chinook winds.

Mr. Little read a communication from Mr. Stewart Mulvey, of Winnipeg, regretting his inability to be present but expressing his pleasure at the prospect of the formation of a Canadian Forestry Association, which he considered of great importance to the West.

The CHAIBMAN.—I hope that the success of the present meeting will be repeated in our future meetings and that we may have as interesting and useful papers. I trust also that it may be possible to arrange for an evening session. I cannot help saying, and I am sure we will all agree on that point, that we have obtained a great deal of information which will be turned to account and such as we will be able to embody in our report.

Moved by Mr. Thos. Southworth, seconded by Mr. Wm. Little, and carried, that in the absence of any publication especially devoted to Forestry, the generous

offer pap and sent

gra to t

offic

Pre reta Din Sou

Vi

ap

M

offer of the publishers of 'Rod and Gun' to establish a Forestry Department in that paper be accepted, and that it be adopted as the official organ of the Association, and also that the secretary be authorized to arrange that a copy of the paper be sent each member of the Association if terms agreeable to him can be obtained.

The election of officers was then proceeded with.

The Chairman suggested that His Excellency, Lord Minto, should be asked to graciously accept the Honorary Presidency of the Association, which was agreed to unanimously.

(His Excellency has since kindly expressed his willingness to accept this

office. The other officers, who were all elected unanimously, are as follows :-President, Sir Henri Joly de Lotbinière; Vice-President, Mr. William Little; Secretary, Mr. E. Stewart; Assistant Secretary and Treasurer, Mr. R. H. Campbell; Directors, Mr. Hiram Robinson, Professor Saunders, Professor Macoun, Mr. Thomas Southworth, Mr. E. W. Rathbun, Mr. C. Jackson Booth, Hon. G. W. Allan.

The Chairman asked for suggestions as to the persons who should be appointed Vice-Presidents for the Provinces and Districts.

The meeting then adjourned.

At a subsequent meeting of the executive committee the following were appointed vice-presidents for Provinces and Districts:-

Prince Edward Island, Hon, Donald Ferguson; Nova Scotia, Dr. A. H. MacKay; New Branswick, Hon. G. G. King; Quebec, Hon. S. N. Parent; Ontario, Mr. J. B. McWilliams; Manitoba, Mr. Stewart Mulvey; Keewatin, the Lieutenant Governor of Manitoba; Assiniboia, Hon. W. D. Perley; Saskatchewan, Mr. Thos. McKay; Alberta, Mr. Wm. Pearce; Athabasca, Mr. F. Wilson; British Columbia, Mr. H. Bostock, M.P.; Yukon, Mr. Wm. Ogilvie.

ita-

ally 7 of 18.11-

irie be ned able y of d is lies arm

ests,

uent se an as a some on a

draw ly the is secerve a

at the West, etory, trees, ust be l occa-

good, winds. great

epeated ers. I ot help a great able to

carried,

#### COI SOI

for qu pa

of

le th as th th b d o a

## ILLUSTRATIONS.

## FOOTHILLS OF THE ROCKY MOUNTAINS.

In connection with the illustration of the effects of fire in the foothills of the Rocky Mountains, the following remarks in the Reports on Irrigation issued by the

of irrigation development, to state the controls clearly. In the first place we may assume that any steps calculated to diminish the present water supply are unwise, and if we point out that the rapid destruction of the timber covering the foothill country, which is annually taking place through forest fires, is calculated to seriously affect this water supply, nothing further should be needed to convince the most indifferent observer of the pressing necessity for preventing and checking these fires as far as possible.

Preventing and encoding these areas as the product 'In its present condition the wooded portion of the watershed of our arid regions receives the annual precipitation in the shape of snow and rain, and after sheltering this moisture from the evaporating influences of fierce sun and strong winds, gradually gives it up to feed the numerous springs and small rivulets which, united, form the larger streams bringing the water to points where it can be diverted for the larger streams bringing the water to points where it can be diverted for such as the stream of the destruction of these forests will come the suddon freshets and rapid run-off of the moisture from this area, due to the lack of shelter from the enormous and expensive storage facilities required to store this run-off until needed for irrigation, the water must go to waste and serve no beneficial purpose. The permanency of our water supply is, therefore, largely dependent upon the protection of the forests at present covering our watershed, and this protection can only be secured by taking steps to prevent the devastating fires which annually sweep

over large portions of the area. By far the largest area in the tract described is covered with brulé, showing either bare-slopes with the whitened remains of the old forests standing or lying on the ground, or else the nakedness of the old timber is partially covered by thickets of scrub pine that have sprung up to hide the old bones; nature's method of scrub pine that have sprung up to hide the old bones; nature's method of

rehabilitating herself. 'Judging by the standing or fallen timber seen in the brulé, the forests, when 'Judging by the standing or fallen timber seen in the brulé, the forests, when green, contained trees of a fair size; and the growth must have been sufficiently dense to retain the moisture on the slopes for a period extending well into the summer, if indeed, it did not last throughout the year. The effect must undoubtedly have been a more evenly distributed flow in the streams, and a less violent run-off in the early spring.'

## ST. MAURICE RIVER.

The view on the St. Maurice River gives a glimpse of one of the most important timber districts of the province of Quebec, one from which large quantities of white pine have been obtained. The great number of logs taken out every season

30

from a stream like this, as partly shown in the illustration, gives an indication of the immense wealth and extent our forest resources. The necessity for cutting farther back, and the increasing difficulty of reaching suitable timber urge the necessity for investigation of the extent of the supply and the most economic method of making use of our resources.

## SCENE IN THE MUSKOKA DISTRICT.

The scene is from the Muskoka district and shows the pine as it appears after coming into contact with a not too kindly civilization. It illustrates, however, some of the conditions to be considered by the forester.

The lumber industry was an important one in that district for some time, but continual cutting and the advance of settlement has not left much of the original forests and the more important timber areas are now farther north. The various questions in connection with the preservation and renewal of the pine forests, particularly in Ontario and Quebec, are of the highest importance, and should receive the earnest attention of the Forestry Association.

## RIVER ROAD, PORTAGE LA PRAIRIE.

In the year 1859, Professor Henry Y. Hind reported to the Provincial Secretary of the Province of Canada, as follows :--

'In the valley of the Assiniboine is an extensive and valuable forest of oak, elm, ash, maple, poplar, and aspen, with an average breadth of four miles; its length is about thirty miles. The flats and hillsides of the deep eroded valley through which this river flows above Prairie Portage, sustain a fine forest, in which aspen, oak, birch, elm and maple appear to prevail in numbers corresponding with the order in which they are enumerated; but this forest does not extend beyond theexcavated valley of the river or its tributaries. All the affluents of the Assiniboine flow through deep ravines, which they have cut in the great plain they drain; these narrow, deep valleys are well clothed with timber consisting chiefly of aspen and balsam poplar, but often varied with bottoms of oak, elm, ash and the ash-leaved maple.

The wooded area in the valley of the Assiniboine upwards from Portage la Prairie is still one of the most important in Manitoba and the view shows the appearance of the river road near that place.

### PARK RESERVATION, LAKE LOUISE.

Lake Louise Forest Park Reservation, in the vicinity of Laggan, British Columbia, contains an area of fifty-one square miles and was set apart by Order in Council of July 23, 1892. The reserve lies to the south of the Canadian Pacific Railway along Bow River and Bath Creek and is situated partly in British Columbia and partly in the North-west Territories, at the summit of the Rocky Mountains. It includes a number of high mountain peaks and some lakes, the principal of which is Lake Louise, from which the reservation takes its name. The beauty of the scenery is un-urpassed, and one of the features that adds to its attractiveness are the forests which clothe the valleys and climb the slopes of the mountains to a height of six and seven thousand feet.

Dur illustration shows such a forest in this reservation, covering the mountain slope. It is extremely difficult, however, to give a satisfactory view of a large mass of forest as the perspective is lost in the reproduction and the impression of extent and size in the original is gone. Care has been taken to preserve the timber from fire and the valleys are filled with a thick growth of wood, so thickly indeed that a photograph taken at a distance shows an unbroken growth that suggests the idea of moss rather than of forest.

the

and g or nber nish ecesthis esent and ption

on of rough hould ty for

gions ering winds, nited, ed for eshets m the of the needed The sweep

nowing ying on hickets hod of

, when iciently nto the ubtedly in off in

importtities of y season

## INDIAN HEAD FARM.

The Experimental Farm for the North-west Territories adjoins the town of Indian Head in Eastern Assiniboia. Indian Head is on the main line of the Canadian Pacific Railway, 104 miles west of the Manitoba boundary, and 105 miles north of the boundary line between the United States and Canada. The soil is of excellent quality. The north half is covered with a black friable clay loam, mixed with a little sand and varying in depth from one to three feet, with a yellowish when a fittle said and varying in dependition one to three leev, with a yerlowish brown elay subsoil. The soil on the larger part of the south half is a heavy elay loam, with portions of sandy loam. A small creek flows through the farm during the spring months, but this dries up in summer, though by erecting two dams across the ravine a small lake has been formed. The land was an open prairie, without

To meet the need for shelter on the open prairie land, tree planting on a fairly tree or shrub. large scale was begun as soon as practicable, and although at first progress was rather slow, the trees first planted soon formed more or less protection for those put in subsequently. A shelter belt 100 feet wide, made by planting the trees 5 feet apart each way, has been located along the north and west boundaries for  $1\frac{3}{4}$  miles. Trees have also been planted in blocks, avenues and hedges.

The illustration shows an avenue of Manitoba maples, seven years growth from

seed.

32

