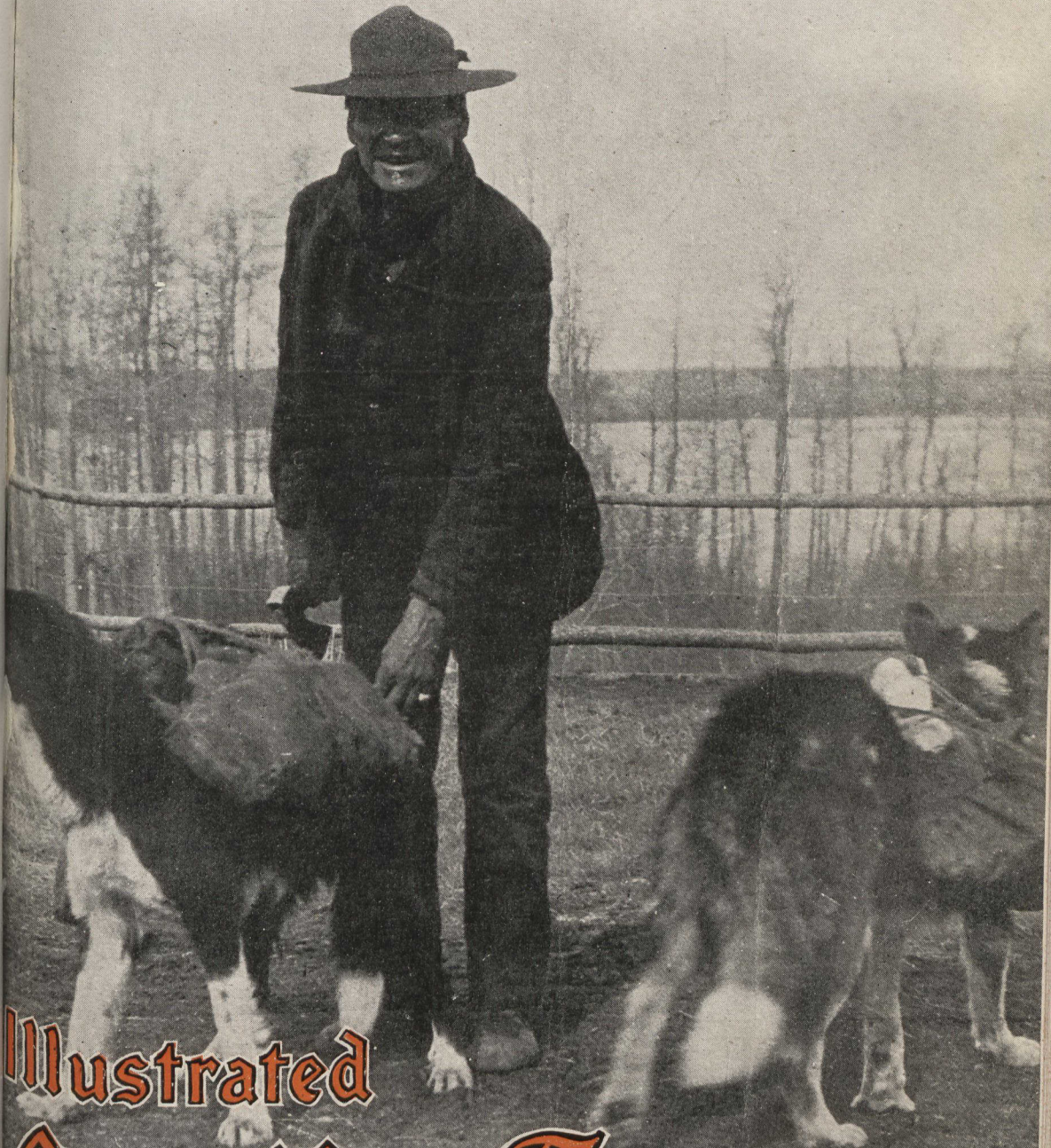


November  
1920

15¢



Illustrated  
**Canadian Forestry**  
Magazine

GETTING READY FOR A WINTER SURVEY



## Bureau of Canadian Information

The Canadian Pacific Railway has established a Bureau of Canadian Information as a branch of its Department of Colonization and Development, with the object of disseminating reliable and up-to-date information as to agricultural and industrial openings in all parts of Canada.

### WESTERN CANADA FARM LANDS

The Company has yet for sale several million acres of choice farm lands in Western Canada, at low prices and on long terms of payment. In certain districts lands will be sold without settlement restrictions, but the Company is prepared to grant special concessions to those who will settle upon and develop their farms.

### IRRIGATED FARM LANDS

In its irrigation districts in Alberta, the Company has irrigated lands for sale at reasonable prices and on terms extending over twenty years. Under certain conditions, loans for improvements will be granted purchasers of irrigated lands in amounts up to two thousand dollars, to be repaid with land instalments.

### EASTERN CANADA FARM LANDS

Lists of selected improved farms, available for settlement in Ontario, Quebec and the Maritime Provinces, with the names and addresses of their owners, may be obtained on application at any office of the Department.

### INDUSTRIAL INVESTIGATION AND RESEARCH

Investigations, looking to the utilization of undeveloped natural resources and waste products and new industrial processes, are being carried on by the Research Section of the Department. Inquiries as to promising fields for investigation in this connection are invited.

### INDUSTRIAL OPENINGS

Reliable information as to sites for new industries in all parts of Canada, and of special business openings in the growing towns and cities along the lines of the Canadian Pacific Railway in both Eastern and Western Canada, will be gladly furnished on request.

### CANADIAN INTELLIGENCE SERVICE

Well equipped Canadian reference libraries have been established by the Department at Montreal, New York, Chicago, and London, England. These libraries contain the fullest information on all matters relating to Canada and her undeveloped resources, and are kept supplied with the latest information pertaining to new developments through the medium of a news service organized through the co-operation of the other departments of the Company's service. The information on hand in these libraries is available without charge to those interested, and inquiries addressed to any office of the Department will receive prompt attention.

## DEPARTMENT OF COLONIZATION AND DEVELOPMENT CANADIAN PACIFIC RAILWAY

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WINNIPEG: J. F. Sweeting, Industrial Agent, C.P.R. Depot.

CALGARY: M. E. Thornton, Supt. U.S. Agencies, Dept. of Natural Resources Building.

NEW YORK: C.P.R. Bureau of Canadian Information, Wilson Building, 1270 Broadway.

CHICAGO: C.P.R. Bureau of Canadian Information, 163 East Ontario Street.

LONDON: A. E. Moore, Manager, 62-65 Charing Cross.

E. G. WHITE,  
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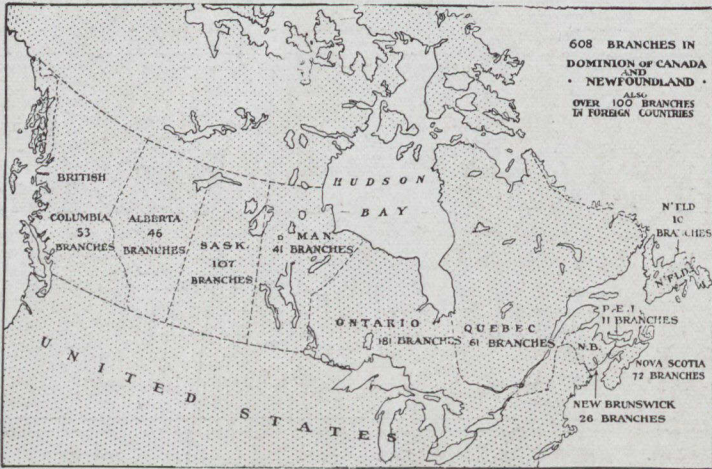
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Membership is open to all. Annual fee \$2, including subscription to the Illustrated Canadian Forestry Magazine, a non-technical interesting monthly. If you like trees, you'll enjoy the Forestry Magazine.

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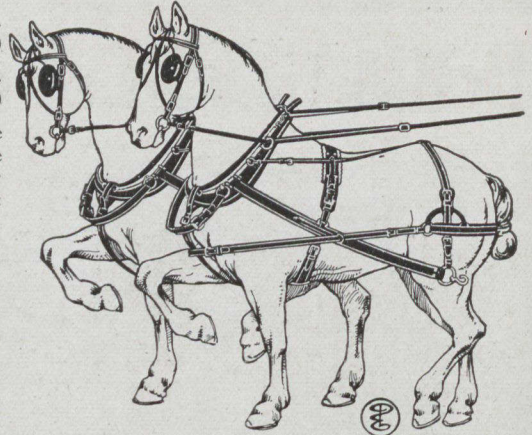
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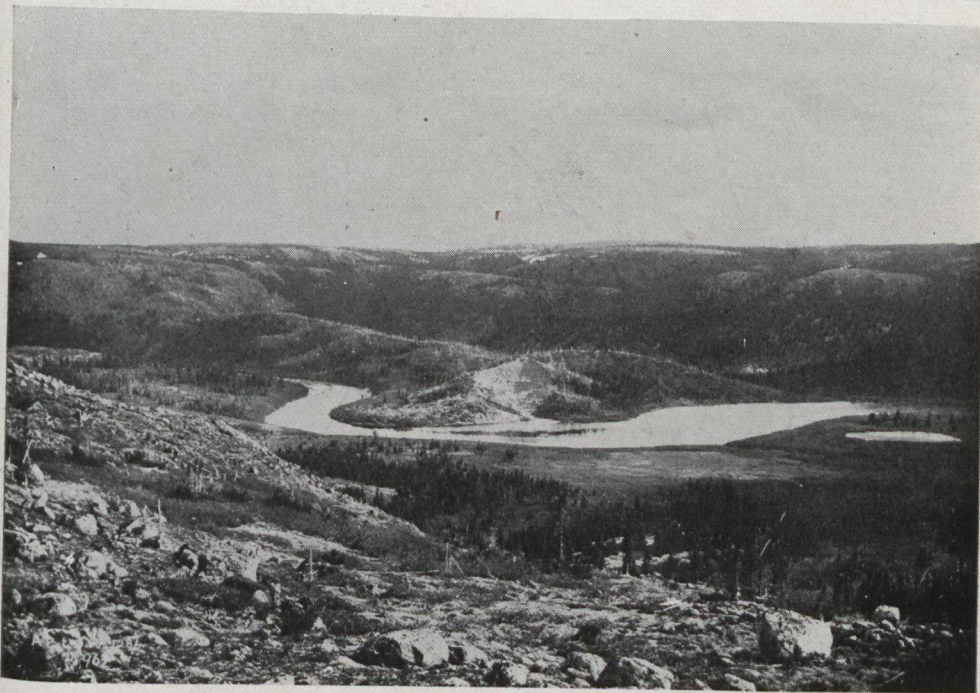
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# Canadian Forestry Magazine

VOL. XVI. PRINTED AT KINGSTON, CANADA, NOVEMBER, 1920. No. 11.



Labrador: A view giving a good idea of the general topography of the country, but not assuming to advertise the timber resources. Until the disputed boundary line is finally determined as between Labrador and Canada, the security of the timber lands titles is too uncertain to attract the pulp and paper manufacturer.

Photo by A. P. Low, Geological Survey.

## “What’s in Labrador?”

Written for the Canadian Forestry Magazine by Dr. W. T. Grenfell, C.M.G., the Famous Medical Missionary.



### Permanent Forestry Industries Certain—Timber and Labor at Hand



Our knowledge of the interior of Labrador and of its timber, pulp, and mineral possibilities is very limited. A few portage routes mostly used by old Hudson Bay Company men, and a few tracks along the main waterways made by Government and other explorers are all that afford us any real information. In 1919,

an aerial survey of the region around the bottom of St. Lewis and St. Michaels Bays, from an aerodrome on the delta of the Alexis River, reported several thousand pictures taken from a low altitude, showing everywhere dense spruce and fir forests covering hillsides and valleys. Mr. A. P. Low of the Geologi-

cal Survey, in his report to the Government in 1896, entirely confirms this. He speaks of all Southern Labrador to 54 degrees N. latitude as a subarctic forest belt consisting of nine varieties of trees. It is continuous with the exception of the summits of rocky hills. In latitude 55 he states more than half the country is treeless, but as far north as 58 valleys and lake edges are wooded. Black spruce (*picea nigra*) constitutes, he claims, 90 per cent. of the trees and, next to it, and more hardy than it, is *Larix Americana*. E. B. Delabarre of Brown University substantiates Low's statements except for saying that the trees near the coast itself are limited to the protected valleys and bay heads. Personally I have visited the bottoms of most of the fyords as far north as Kikkeroaktokak (Finger Bay), just north of Nain, and then west round Cape Chidly into Ungava Bay. At the head of Nain Bay, 40 miles inside or west of Nain, and 60 miles from the outer islands, the forest was very dense on the hillsides and of good spruce. Along the rivers and valleys between Cape Harrison and Hamilton Inlet and north as far as Hopedale there is also quite a lot of forest. I have seen from Big River in Adlavik Bay spars over seventy feet long floated out. But how far into the land the forest runs there, I am unable to say. There is no timber on the coast line north of Hebron, and little inside Cape Mugford till the heads of the bays are reached, or the valley of Georges River. The Valleys of the Grand River and the Norwest River, the Kenaonou, Kenamish, and Mulligan's river in Hamilton Inlet have all a good quantity of timber that would serve for paper pulp many years, and afford some for lumber of good size.

With some University students I made a tour into the country this summer at the bottom of Lewis Bay to look at the timber, where we have at last succeeded in obtaining just 25 square miles on the extreme seaboard and have been instrumental in starting a small mill that is employing 40 families. The land is a series of hills and valleys, the latter filled with lakes and the sheltered hillsides being covered with excellent timber. These self-draining slopes are apparently far

the best for the tree growth, although the ability of the ground to hold up tall trees in heavy gales of wind is limited to some extent. On the almost perpendicular sides of the lofty cliffs that flank the extreme northern fyords, I have seen the whole ground covering of the entire hill face that has slipped off, carrying every vestige of vegetation with it in headlong ruin into one huge mass at the foot of the cliffs.

#### *Some 70 Feet High*

The valley of Grand River up to the Falls has been burnt over and the original big spruce deteriorated into smaller timber, though in many places fine logs for sawing into lumber abound. There is endless power in these rivers that can be utilized if needed. Round the Falls itself the trees are mostly spruces and according to Eugene Delano and A. P. Low, are 70 feet in height. An experienced lumberman, Mr. Martin, of St. Johns, Newfoundland, who recently made a personal investigation of parts of the coast tells me that nothing but lack of labor, and the inability to obtain sound titles to land grants because the boundary question remains unsettled, prevent profitable pulp and paper industries being opened on the East Labrador Coast. Manufacturing there should be very cheap and though shipping to Europe would probably have to be made between late June and early December, the distance is so short and so safe, that commercial results, as successful as those of Lord Northcliffe's mills in Central Newfoundland, should be quite possible.

#### *Not So Cold in Labrador.*

The actual temperatures on Labrador are not nearly as severe as further from the seaboard. The minimum temperature has scarcely ever been known to be as low as 40 degrees F. This was greatly impressed upon me when the very successful mills at Iroquois Falls, Ontario, were being started. A hundred men from Newfoundland and Labrador went to work there. Practically none remained long and all to whom I spoke complained of it being too cold for them. All of my colleagues, both doctors and nurses, who have visited in Labrador have thoroughly enjoyed the winter





Labrador: The mouth of the Wiachouan River, Richmond Gulf. Photo by A. P. Low, Geological Survey. Grenfell explains clearly, the timber lies in pockets, some representing quite heavy stands, but not near the coast. Recently, Labrador has come into the limelight as a possible source of new pulpwood supplies.

there. One doctor, who came to us from Uganda, put on over 14 pounds weight during the winter.

#### *Problems of the People.*

The occupations of our people at present are seasonal. Neither fur nor fish can be considered a constant harvest. The fur is apt to run in cycles, the foxes and their food, the mice, disappearing for a couple of years simultaneously; so that, as is the case this year, we know the hunt will be small and there will be shortage and possible hunger on the coast. Similarly with the Cod; some years they fail to reach into the land, they and the bait fish, called Caplin, being simultaneously missing along certain sections of the Coast. We believe this depends entirely upon the local temperature of the water, whether due directly to the winds or indirectly to ice movements, the difference of one degree we think makes a difference to the bait fish which lure the cod to the shore when they (Caplin) come to spawn. That these wage giving industries should be introduced is therefore of the utmost importance as far as the welfare of the Coast is concerned,

and we, who live there, most earnestly hope that the boundary question may soon be settled, that proper grants be issued to encourage operators and that the laws concerning grants be rigidly enforced. At present, one of the great hardships, and one that is very materially affecting the population is the fact that the residents of the Coast may not start even small lumber mills because provisional grants have been made of practically all the available country to companies who do not work the area, but continue to hold the rights in spite of existing laws to the contrary. Most of these holders have done nothing for the country, do not live in the country, and simply have taken up the rights in the hope of selling them for personal gain. Several grants have already been sold and resold, but never yet worked and show no signs of commencing. In these days of ever-increasing industrial unrest this form of profiteering is a constant source of irritation to the laboring people and is unquestionably a factor that makes for unreasoning resentment to all law and order.

### *What Development Means.*

A small concrete example of the development of our timber areas might serve to emphasize the point. This year His Excellency, the Governor of Newfoundland paid us a visit and Dr. Harry L. Paddon, my colleague for eight years, was able to point out the very great probability of there being hunger during the winter as the fur prospect was very small. His Excellency considered the matter of sufficient importance to have a government inspector go all the way north from St. John to examine a boiler left with other machinery on the coast at the bottom of Hamilton Inlet, with a view of having half a million or so of lumber sawn to give work for trappers who might make poor hunts.

The one and only real need of Labrador, as I see it, is some wage earning industry, such as pulp and paper making would afford, and which we are confident it will see in the next few years.

To the Empire, the asset of a people preserving our seafaring genius along that coast, handy, hardy, self reliant and resourceful, with true British loyalty and ideals would be invaluable and whoever helps toward that end is a better patriot than he who says "the North is a cold country; every Englishman should move to the softer places of earth."

*Wilfrid Grenfell.*

### **The Labrador Boundary.**

The coast of Labrador was annexed to Newfoundland in 1763. Ten years later, owing to difficulties arising out of grants made to a number of persons under the French rule, it was changed to Canadian jurisdiction. In 1809 it was again transferred to Newfoundland and has since been attached to this colony.

The difficulty arises over different interpretations of the words "coast of Labrador." One view is that Newfoundland can claim only the coast between Blanc Sablon and Cape Chidley, with perhaps a half a mile inland, and that the rest of Labrador belongs to Canada. As defined in the letters patent, constituting the office of governor of Newfoundland, the boundary was described as a line drawn between Blanc Sablon and Cape Chidley, which would pass through the

ocean in certain sections and leave large areas of the coast to the westward of the line and therefore not under Newfoundland jurisdiction.

Many Newfoundland officials hold to the view that the correct delimitation was made in a sessional paper issued in this colony in 1864. Under the phraseology of this document Newfoundland would be entitled to thousands of square miles of the interior of the Labrador peninsula in addition to the coast.



A plantation of Scotch Pine in Windsor Forest, England, at the age of 20 years.

## The Canadian Forestry Association

1915 - 3,000 members

1920 - 11,000 members

## Ontario to Establish Demonstration Woodlands

Ontario has taken an important forward step in the encouragement of tree planting on barren areas. Hon. Manning Doherty, Minister of Agriculture, recently instructed the Agricultural Representatives of the Provinces in the various counties to take up with the Township Councils the question of establishing demonstration plots of planted trees along well traveled roads. The educational effect of such an enterprise would be incalculable just as demonstration orchards are the most effective form of 'propaganda' in the encouragement of apple production. A letter from the Minister of Agriculture to the Forestry Association states that "the Department is co-operating with the Department of Lands and Forests by endeavoring to interest local Township Councils in the matter and possibly later on giving general supervision to any woodlots which may be established."

Mr. Doherty's letter to all agricultural representatives was as follows:

Toronto, October 4, 1920.

It is the desire of the Government that the reforestation of waste lands be encouraged as generally and as rapidly as possible. In every Township there are areas of land which are used for absolutely no purpose but which would, with attention, produce a crop of timber in a comparatively few years and fully repay the effort and expenditure devoted to the matter. This Department is co-operating with the Forestry Branch of the Department of Lands and Forests in this matter.

To bring this subject prominently to the attention of the people the Government would like to see a demonstration plot established in each township and to this end desires the co-operation of the Township Councils. If the Township Council will purchase an area suitable for this purpose on a well travelled road and have it properly fenced, the Government will undertake to supply and plant trees to reforest such area and look after

it in the early years of growth. Such an area of land should not be less than five acres or more than ten acres.

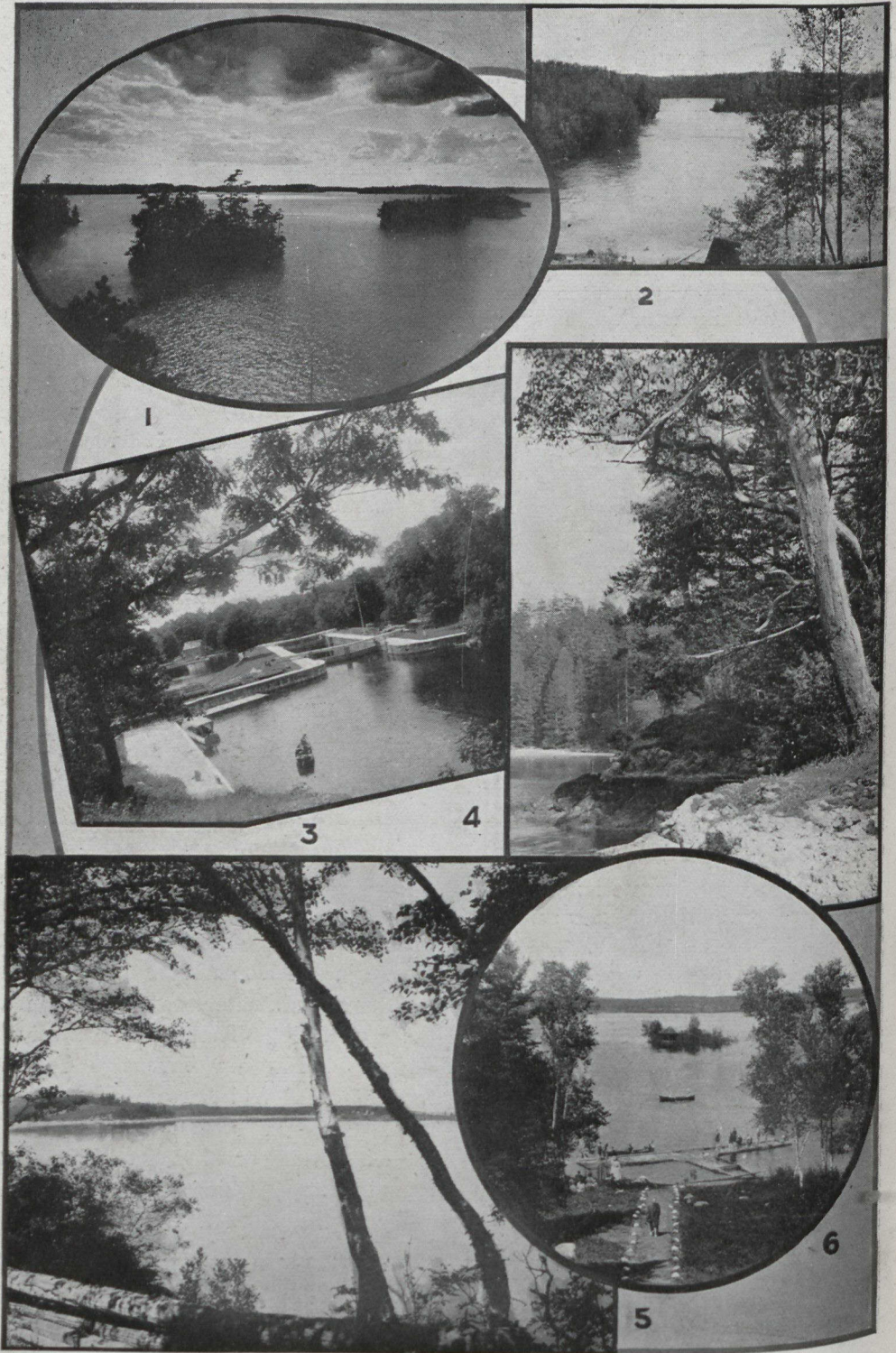
It is my desire that you should bring this proposition to the attention of the Township Councils in your County. I would suggest that you write a letter to the Reeve of each Township outlining the proposition and that you endeavor to see the Reeve of each township personally and discuss the matter with him or as far as possible attend the meeting of the Township Council at which the proposition is discussed. Please assure the Councils that your services are at their disposal in the selection of land for this purpose, as it will of course be expected that you will give the matter your supervision in any Township in which such demonstration wood lots are established.

It should be possible to have a large number of these demonstration wood lots started next spring and applications should be received before December 31st. It should be clearly understood that all such demonstration plots will be vested in the Township and any profit which may ultimately accrue will go to the Township. The expense involved on the part of any Township Council is small and I feel that the result in the awakening of a greater interest in this most important problem would inaugurate a movement which would be of great value to the permanent development of this Province.

Trusting the matter will have your prompt and continued interest and attention, I am,

Yours very truly,

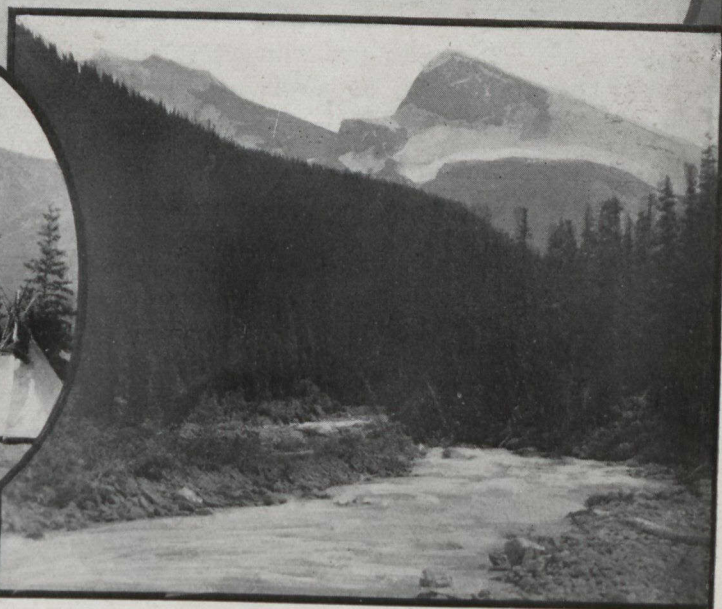
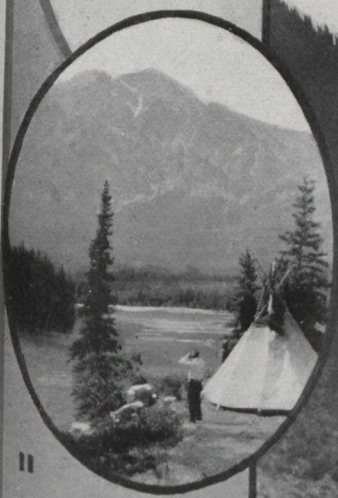
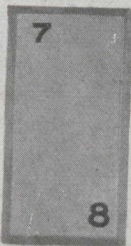
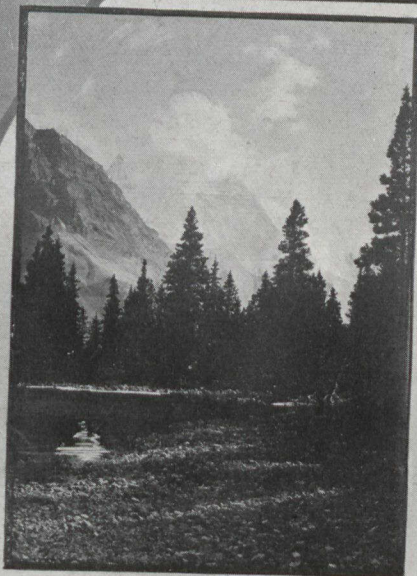
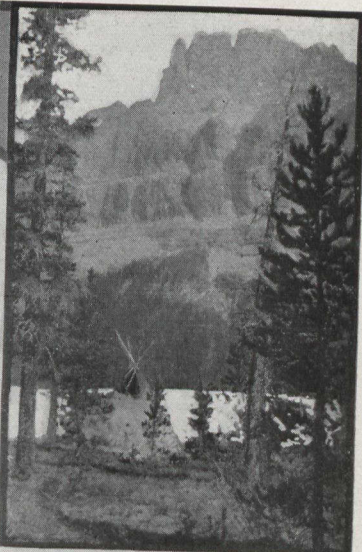
Manning W. Doherty,  
Minister of Agriculture.



OUR LAND OF LAKES AND RIVERS.

1. Venetia Island, Muskoka, Ont. 2. A Quiet Stretch on the Nipigon. 3. A Lock on the Rideau Canal. 4. Near Vancouver, B.C. 5. In the Rideau Lakes. 6. At Minaki Inn; a Winnipegger's Resort.

(Courtesy Can. National R'ys.)



7. C.N.R. Transcontinental Train at Jasper in Alberta. 8. The "Palisades," 9,000 feet in the Famous Maligne District. 9. Mount Robson, B.C., 13,068 feet high, the Monarch of the Canadian Rockies and clearly visible from C.N.R. 10. The Selwyn Range and Moose Lake in B.C. 11. Pyramid Mountain, 9,000 feet high, near the Entrance to the Yellowhead Pass. 12. Mount Warren, 10,500 feet high in Jasper National Park, Alberta.



An afternoon audience of school children at Young, Saskatchewan. This fine body of little folks have just heard Mr. Mitchell's talk on "Tree Planting on the Prairies," together with the motion picture display given inside the Canadian Forestry Association's Tree Planting Car.

## Our Travelling Railway Cars

Still going strong and with public interest constantly increasing, the Canadian Forestry Association's Tree Planting Car drew into Carnduff, Sask., recently. Thus reads a few paragraphs of the daily diary:

Afternoon lecture held in two parts: At 2 p.m., 126 children attended; at 3.30 p.m., 70 High School pupils, with 9 teachers and seven other adults came. Car packed for evening lecture, with many turned away. Audience not afraid to ask plenty of questions.

Deloraine, Manitoba: During morning, our Car had a number of visitors. Gave them an impromptu lecture. Afternoon lecture attended by 86 High School pupils, the Principal and 34 other adults. Evening lecture attended by 97 people. An excellent discussion followed. District has suffered from soil drift.

So reads the day to day record of the Association's unique enterprise in the prairie provinces.

Our Eastern Car, called the Forestry Exhibition Car, has been devoting itself to Ontario for some time past and will wind up its Ontario tour at Pembroke and Braeside about November 11th. After that date, if weather permits it will

be quickly re-arranged for another Quebec tour of three or four weeks. To it will be attached a special Lecture Car, capable of seating one hundred adults. The Association hopes to send the two cars direct to Three Rivers and use them for educational work in Central Quebec, until snow conditions make further hauling impossible.

The volume of visitors to the Forestry Exhibition Car during its run through Ontario has been unprecedented. Liberal advance advertising was, in part responsible, but the Car, which has lately received many improvements, has attracted crowds at every stop. For example, at Waubaushe, Ontario, such a large number of people came out for the evening motion picture demonstration that it was necessary to open a nearby skating rink where over eight hundred people attended. In many places, the school boards have declared half holidays or have arranged for school essays on forest conservation to supplement the work of the car's exhibits.

Co-operation on the part of all local authorities along the route has been remarkably generous.

# How New Brunswick Guards Forests

The development of an efficient fire protective organization has been made possible through the inauguration of the N. B. Forest Act and Forest Fires Act of 1918, the former placing the administration of all matters pertaining to forest fire protection under the Forest Service and the latter Act containing the most modern regulations of carrying out the work of fire protection.

With provision made through these two Acts, a staff of about 1,000 men have been organized to act in case of fire during the dry season and having as a nucleus the permanent staff of Inspectors and Forest Rangers, headed by the Provincial Forester. Each year the staff of temporary men has been increased and the public has become more interested and greater co-operation is possible.

## Permanent Staff:

### Office Staff.—

- Provincial Forester.
- Assistant Provincial Forester.
- Chief Game Warden.
- Chief Scaler.
- Stenographers and Clerks. Total 8

### Outside Staff.—

- Inspectors. .... 5
- Forest Rangers .... 37 Total 50

With this permanent nucleus of fifty, an organization of nearly 1,000 men was maintained during the past severe fire season, with full authority to act in case of fire and call out men. These temporary men within telephone call were of immense value during the very hazardous times in May and June of this year, and made it possible for a ranger to deal promptly with all fires in his own district, in spite of the fact that fires occurred in many parts of his district at once.

The temporary force consists of the following:

- Voluntary Fire Wardens.... 150
- Co-operative Fire Wardens.. 100
- Temporary Game and Fire Wardens ..... 50
- Road Supervisors acting as Fire Wardens ..... 500

Caretakers of Settlements....	10
Labor Act Commissioners....	125
Railway Patrolmen .....	60
Look-out Men.....	4
Total .....	1,000

The voluntary fire wardens are citizens of settlements in forested sections having authority to call out men to fight fires occurring, and also in many cases to issue fire permits.

The co-operative fire wardens are woods foremen in the employ of lumber companies who received the same authority as Government Fire Wardens.

The Road Supervisors in the employ of the Public Works Department rendered very valuable assistance by acting as fire wardens in case of fire, having been instructed to do so by the Minister of Public Works.

The railway patrolmen on railroads under the Railway Commission and under Provincial Charter were employed and paid by the railroads, while the other railroads entered into a co-operative agreement whereby railway patrol was maintained, the Forest Service assuming the greater part of the cost.

## Co-operation Secured.

In addition to the above temporary force, the effectiveness of the Forest Service in controlling forest fires was greatly increased through the co-operation obtained from the various lumber interests, railroads, provincial departments, citizens and professional men. It is interesting to note the increased interest taken by the people of the province and their hearty co-operation is absolutely necessary for the successful extermination of forest fires. Much success has been attained through the use of propaganda, fire posters, warnings to fishermen, campers, the Canadian Forestry Association with its exhibition car and motion pictures, etc.

## Area Protected.

The province contains over 12,000,000 acres of forest land, 7,500,000 of which belongs to the Crown. Fires were

fought and extinguished on both Crown and private lands, and it is interesting to note that out of this large area only about 20,000 acres of timber lands were destroyed.

During the past season the department has employed crews of men to extinguish over 150 fires and in addition about three hundred small fires were extinguished by the regular patrolmen and rangers without extra men before they had time to spread, and still other fires were put out by private individuals and lumber companies.

#### *Permanent Improvements.*

Two look-out towers are equipped and were used last season with good results, several fires having been located from them.

Tool caches are maintained at various points, and all rangers are supplied with fire fighting equipment. Ranger cabins have been built at many isolated points and stocked with fire fighting tools and emergency rations. The fire protective organization in New Brunswick has developed wonderfully during the last two years and plans are being made for much further improvement in the coming year.

## ***The Pulping of Jack Pine***

Some years ago the Wayagamack Pulp & Paper Company Limited, Three Rivers, Que., was equipped with complete apparatus for the purpose of experimental pulping of all the different species of wood.

Experiments have been systematically carried on for a number of years with the object of discovering what different species of wood were suitable for the different qualities of pulp required for the manufacture of all kinds of paper.

In the provinces of Ontario and Quebec there are enormous tracts of land timbered almost exclusively with what is known as Jack Pine, also called Bankian Pine, or Cypress.

For this reason, it was important to ascertain if Jack Pine could be used for the manufacture of sulfite pulp and ground wood, in spite of all the prejudice against its use for this purpose.

A preliminary examination of Jack Pine, with regard to its resin contents seemed to indicate that the resin was not present in quantities which would prohibit its use for the manufacture of sulfite pulp or ground wood, although Jack Pine seems to have had to carry the blame for all the pitch troubles which all paper mills suffer from, more or less.

If Jack Pine is cooked in a mixture with other wood, trouble is quite likely to result, because Jack Pine apparently requires a stronger acid and a longer cooking time than other species of wood.

If, however, Jack Pine is cooked alone, the company's experiments, as well as those reported below, would indicate that Jack Pine will produce a sulfite pulp which is in all respects equal to Spruce Pulp. The fibre from Jack Pine was found to be about .25 mm. longer than Spruce fibre, which will make it particularly suitable for newsprint.

Some years ago, by special arrangement with Geo. McDougall, of the Jacques-Cartier Pulp & Paper Co., of Pont Rouge, the Wayagamack Pulp & Paper Company Limited, shipped a quantity of Jack Pine to be pulped into ground wood at the Pont Rouge plant.

The pulp obtained from this wood proved to be as good as, if not better than, anything that could be purchased on the market.

The Wayagamack Pulp & Paper Company would like to call the attention of the trade to the fact that from all the experiments made, there is no evidence of excessive pitch which could be traced to the use of Jack Pine.

By arrangement with Messrs. Arthur D. Little Inc., of Cambridge, Mass., sulfite cooking experiments were performed at their laboratory and the Wayagamack Pulp & Paper Company have pleasure in publishing the principal results with the consent of the Arthur D. Little Inc., in the hope that the facts will be of interest to the industry.



It should be carefully noted that the figures obtained from the experiments of Arthur D. Little Inc., seem to demonstrate that the results obtained from the measurements of fibre length and content of pitch for Jack Pine as against Spruce, show that the Jack Pine is *fully equal to Spruce in every respect.*

The following is an extract of the detailed report by Arthur D. Little, Inc.:

*"FIBRE LENGTH AND PITCH."*

The fibre length of pulp from Jack Pine was rigidly compared with that of Spruce and the results of our measurements are as follows:

	<i>Jack Pine</i>	<i>Spruce</i>
Maximum length of fibre . . . . .	3 mm.	2½ mm.
Minimum length of fibre . . . . .	1¼ mm.	1¼ mm.
Mean . . . . .	2.26 mm.	1.92 mm.
Percent of fibre over 2 mm. . . . .	80 p.c.	73 p.c.

It will be observed that the fibres in the Jack Pine are superior in length to those of Spruce and should therefore be an excellent substitute for the Spruce, especially in connection with newsprint paper.

As the content of pitch in woods is practically always an indication of their behavior in either the sulfite or ground wood process, we have made an ether alcohol extraction of this Jack Pine to determine the total resins and waxes. These were found to be as follows:

Alcohol extract . . . . .	2.28 p.c.
x. Ether extract . . . . .	.30 p.c.

Total Fats, Resins  
and Waxes. . . . . 2.58 p.c.

x. Ether extraction made successive to alcohol extraction.

Results of this analysis do not indicate that an excessive amount of resin is present and, furthermore, that this amount of resin does not necessarily preclude the use of Jack Pine in the sulfite process.

It is to be hoped that any person who has made experiments along this line will publish the results of the experiments, for the benefit of all concerned.

F. I. RITCHIE.

Wayagamack Pulp & Paper Co., Ltd.,  
Three Rivers, Que.

### Mr. Grainger Resigns.

Mr. M. A. Grainger, Chief Forester of British Columbia, has resigned to enter private business. In making the announcement, the Minister of Lands, Hon. Mr. Pattullo highly praised Mr. Grainger's work. "He is a man of exceptional ability and the highest qualifications and his resignation will be keenly felt in the forestry service."

Mr. Grainger, who is an Englishman by birth and a graduate of King's College, Cambridge, having been twenty-first wrangler in mathematics in 1896, came to Canada the next year and participated in the famous gold stampede to the Klondike. There he engaged in hydraulic mining. When the South African war broke out he returned to England and enlisted as a private in Roberts' Horse and served throughout the war. He possesses the South African medal with six bars.

After the war he returned to British Columbia, where he spent some years in the mining and lumbering industries, finding time to contribute a number of articles to Old Country papers and also to write an interesting book, "Woodsmen of the West," a work which accurately depicted life in the lumber camps and described the vast forest wealth of this Province.

As secretary of the Forestry Commission which investigated the conditions of the industry and the extent of the forest areas of the Province, Mr. Grainger rendered valuable services.

In the legislation which has been drafted relating to the lumber industry Mr. Grainger has taken a leading part; he played a very important part in the organization of the branch which aimed to be one composed of men technically competent.

### Hunting Season Cut Off.

The following is indeed a noteworthy despatch. For a hunting season to be arbitrarily cut off by public authority because of the devastation caused by hunter's cigarettes and unextinguished camp fires is perhaps a happy sign that the method of persuasion may be backed up in Canada by a little more of compulsion.

Boston, Oct. 25.—During the hunting season which opened last Wednesday, and which was suspended yesterday by proclamation of Acting Governor Cox, more than 10,000 acres of woodland were burned over, according to a statement today by Commissioner of Conservation W. A. L. Bazeley. Nearly all the forest fires were started by hunters' cigarettes, he said.

With light showers forecast for tonight it was expected the fires still burning would be quenched but the ban on hunting will not be raised until the woodlands are soaked by a heavy rain.

### Exhausting the "Inexhaustible."

"Since I have seen your forests and what is left of your forests in many places, I have felt it my duty to do my share in convincing the Americans of the necessity of reforestation. I have heard many people say that there is enough timber left in the south and in the far west to supply the nation for many years. It is not true. When you are in the west they will tell you that the timber is in the south. In the south they will tell you to go to Idaho and Washington. Ten years more cutting the way it is now done by the great lumber concerns and there will be a scarcity of timber in this country. You will have to import lumber.

ALEX. E. F. SCHARD,  
Swedish Forester, in an address at  
N.Y. College of Forestry.

### Toronto Plants Trees.

Toronto's Parks Department has planted 4,487 trees upon the city's streets during the season just ended, a record which has not been exceeded since before the war. They are chiefly Norway maples and American elms, with a few ash.

A despatch from New York indicates that chestnut trees are being discarded there for street use, because they cannot stand the gases from motor cars. "We long ago abandoned the chestnut," said Toronto Parks Commissioner Chambers. "It is a pest-breeder, short-lived, and its foliage litters the streets."

Mr Chambers announced that Lombardy poplars—sometimes called the "exclamation mark" among trees—will be used along the new boulevard to the Humber River, including the Exhibition waterfront.

### Paper Suits Sell From \$8 Up.

Large quantities of paper suits made in Germany are being displayed by a British firm of importers at its shop in London, according to a despatch received in Washington.

These ready-made suits are cut to English styles and are said to be of the very best class of paper texture, and are being retailed at from \$8 to \$40 a suit. Last month 40,000 of these suits were imported by a firm of transport agents from Germany via Holland, and another consignment of 5,000 is on the way. Further consignments are expected to arrive at frequent intervals.

A large number of the suits have been re-exported to India and South Africa, says the despatch, but some merchants in London are of the opinion that in view of the present high price of clothing there are wide possibilities in paper suits, especially in industrial districts, if they could be cut more in the English style and to English tastes.

The agents who are dealing in these suits state that by buying under the present rate of exchange it is possible for a man to purchase a new suit once a week, and that over a period of twelve months the entire cost would be less than the price of one single English suit.

In an excellent photograph of spruces and maples at Brandon appearing in the August-September issue of the Forestry Magazine, credit should have been given to Mr. Allan Campbell of Brandon who took the photograph and supplied it to the publication.



"ISLANDS" OF TREES PLANTED AT MAGRATH, ALBERTA.

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## How to Lay Out a Small Town Park

*By Archibald Mitchell, of the Canadian Forestry Association's Staff*

During the tour of the Tree Planting Car of the Canadian Forestry Association in the prairie provinces in the summer and fall, Mr. Archibald Mitchell, the Association's representative, prepared numerous plans at the request of municipal authorities and local societies for the establishment of parks and the re-arrangement of school and church grounds. Mr. Mitchell in each instance made a careful personal study of the local situation and then drew up a complete scheme of tree planting on which every

reliance may be placed. Our Western readers will note that Mr. Mitchell strongly favors in the case of small parks the artistic grouping of trees so as to form "islands" and deprecates the common practice of planting in straight rows.

The following article, originally prepared for the information of the people of Imperial, Saskatchewan, contains so much of value to other Western towns that it is herewith reproduced in full:

To understand the idea of this Park



THE "ISLAND" PLANTING IDEA IN A SMALL TOWN PARK.

it will be well to bear in mind what a Park is for.

A Park is a place for recreation; a place where we can go for a rest; an entire change from our usual surrounding; a place for "mental sanitation."

Now there are two features of the Prairie which are decidedly monotonous and those are its tree-lessness, and the straight lines on which it is laid out. Straight roads east and west, north and south, straight fences and telephone lines, straight streets and houses in towns, even the horizon is more or less level and what we need in a Park is a place where we can get away from straight lines, and enjoy the beauties of natural curves. Nature very rarely works in straight lines, but she abounds in curves and in our Park we want to get back to nature as much as possible. The desire for a park is only an expression of such a feeling.

#### *No Straight Lines.*

Thus, in the Park before us you will see there is very little allowance for straight lines. All the walks are curved and the outlines of the tree islands or groups are all in bold curves. In this way we provide an entire change from the Prairie, for the tree groups will provide a striking contrast to the treelessness.

There are no long lines or avenues of trees. The proper place for them is on your street, not in the Park. Besides, they are expensive to maintain as they have to be kept cultivated or watered, year after year, adding greatly to the taxation of the town.

These islands of trees are in reality miniature forests, arranged in such size, and mixture of varieties as will render them self-maintaining in 3 or 4 years, just as our forests are.

In Parks, as in most other things, it is not the original cost that matters so much as the upkeep, the constant drain afterwards, and this island arrangement is designed to do away with this very thing. Planted properly on well prepared summer fallow they should not require more than three or four years cultivation amounting to some week's work of a

man and a single horse and cultivator each year. A very small item.

After the third year, the branches of the trees will be meeting and shading the ground so that cultivation will be no longer necessary. The trees being planted close together will present a solid mass of obstruction to the passing of the winds which will thereby be compelled to go over and not through the plantation, drying it out. In this way the moisture that falls amongst the trees, whether snow or rain, will be retained for the use of the growing plantation.

The trees should be planted four feet by four and seedlings used. The Russian Poplar will be cuttings. The following is a list of the trees required and they should be mixed according to the planting plan and planted in rows to allow for cultivation.

1,000 Maples seedlings 12-18 inches.

150 Ash Seedlings 12-18 inches.

150 Elm Seedlings 12-18 inches.

150 Jack Pine (*Pinus Banksiana*) 12-18 inches.

1,500 Russian Poplar (*Populus Petrowskiana*) Cuttings.

If you care to use Russian Poplar Plants well and good.

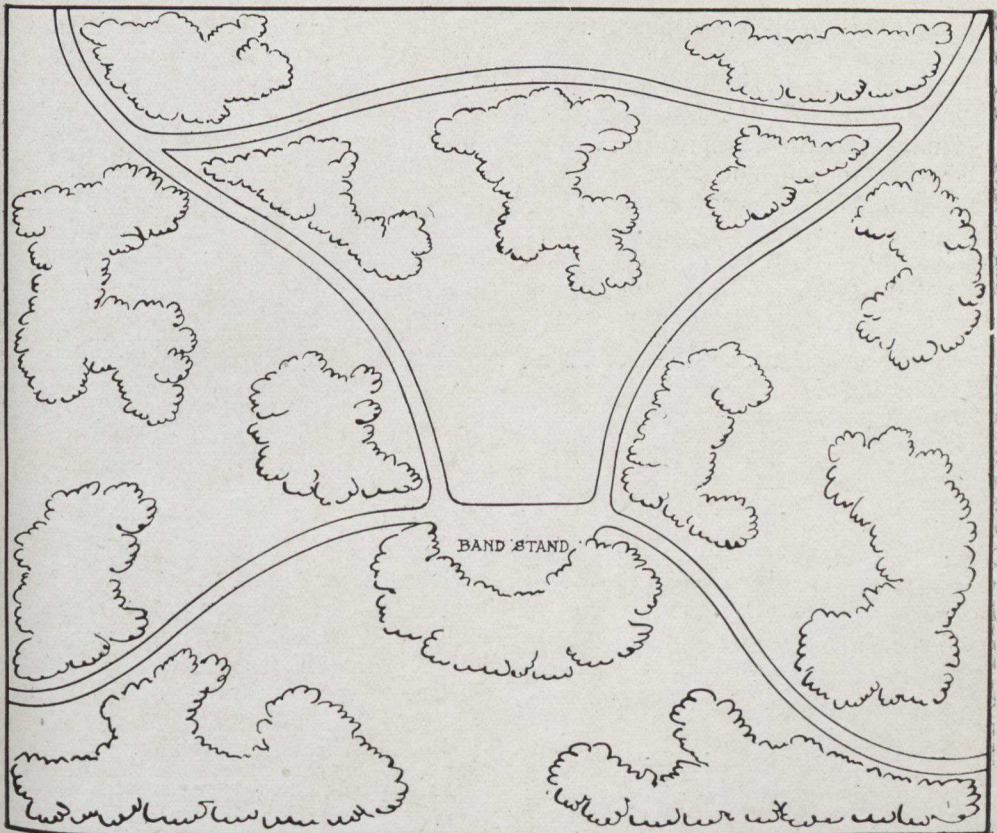
There is no reason why the whole Park should not be planted this coming spring, though there will be more plants to replace in 1922 on the stubble land and those that live will not do so well the first summer, but when you are at it you may as well do it all.

The stubble should be plowed and packed this fall and smoothed ready for the work in spring. Two men should do the whole planting in less than two weeks.

Care must be taken to cultivate the groups as soon as they are planted, and thereafter every two weeks till the end of July, whether weeds appear or not.

#### *Laying out the Ground.*

The first thing in laying out the ground will be locating the bandstand. This will be a semi-circle in the middle of the eastern boundary of the level ground. The straight edge bounded by the bottom of the rising ground. The semi-circle is about twenty yards wide from north to south and ten yards in radius



· PLAN OF TOWN PARK ·

towards the west. This open space can be gravelled as the town feels itself able to do it and the bandstand erected. The curve of the trees will protect it from the prevailing winds from the west and make it a snug sheltered place.

The next thing will be marking off the paths as the location of the tree groups will depend on where they are. To do this I would suggest the purchase of a thousand twelve inch flower pot stakes. They are white and easily seen, very cheap and will also be useful for marking off the tree groups.

#### *Marking the Paths.*

Each small square on the plan is one yard, so it will not be difficult to locate anything on the ground. There need not be much time taken up with accurate measurements with a tape line. Good enough results can be obtained by careful pacing. Every outline is flexible and may be moved a foot or two, one way or the other, but in general the plan should

be adhered to. Particularly is this necessary in the case of the walks, which are in long sweeping curves. They must not be crooked. The bold outlines of the groups should be adhered to, as these add very greatly to the effect. The walks should be six feet wide and a long piece of twine will be necessary to lay them out. Mark the ends and three or four points along the walk, measuring from two sides of the park, stretch the line loosely along these points and then use the pot stakes to get the sweeping curve effect on the balance of the line. The entrance from the outside should always be at right angles to the street for a few feet at least.

After a walk has been laid out it should be marked with a few stout pegs and the pot stakes used for another one. The outline of the walk can easily be picked up again from these permanent stakes and the original curve re-established with the line and small stakes when it comes to be finished.

The borders of the tree groups should not be closer to the walks than three feet and the trees should not be nearer the outline of the group than four feet.

Planting should be done with a spade, directions for which may be found in my bulletin entitled "The Farmers Plantation," on page thirteen. This may be obtained free from the Forestry Office, Indian Head.

#### *How to Make the "Islands."*

In marking the groups the northwest one for example, pace along the western boundary for forty nine yards going east, marking each ten yards with a stake. Pace out from each stake the distance as shown in the plan, observing and marking both outside and inside curves. Connect up these stakes by marking the ground with a hoe, making the curves of the outline bold and full. You will not find much difficulty after you get on to it and remember it is always better to have the tree groups too large than too small.

The grass should be sewn on the whole Park this spring, and Kentucky Blue Grass with about a third of White Clover, should be used. The grass should be sown in three lots by hand, going N. and S., and E. and W. alternately, finishing with the White Clover. Do a small piece at a time. Each sowing should be raked in when it is made, and the whole thing rolled firm after it is all done.

After the walks are pegged out, the easiest way to make them is to plow along the line of the pegs, using a rolling coulter, if possible, to cut a clear furrow, and throwing the earth into the walk. Three or four inches deep will be quite enough. The grass edge bounding the walk must be sharp and a clean clear furrow is essential. While the clean sharp edge can be restored and improved with the spade, the less of that the better, as it takes time. After the furrows are made, the centre of the walk should be rounded up by using a "V" along the furrow and throwing the loose soil into the middle.

The "V" is made of 8-inch plank. It makes a fine job and saves a lot of work. An ordinary small road drag can be used for the same purpose.

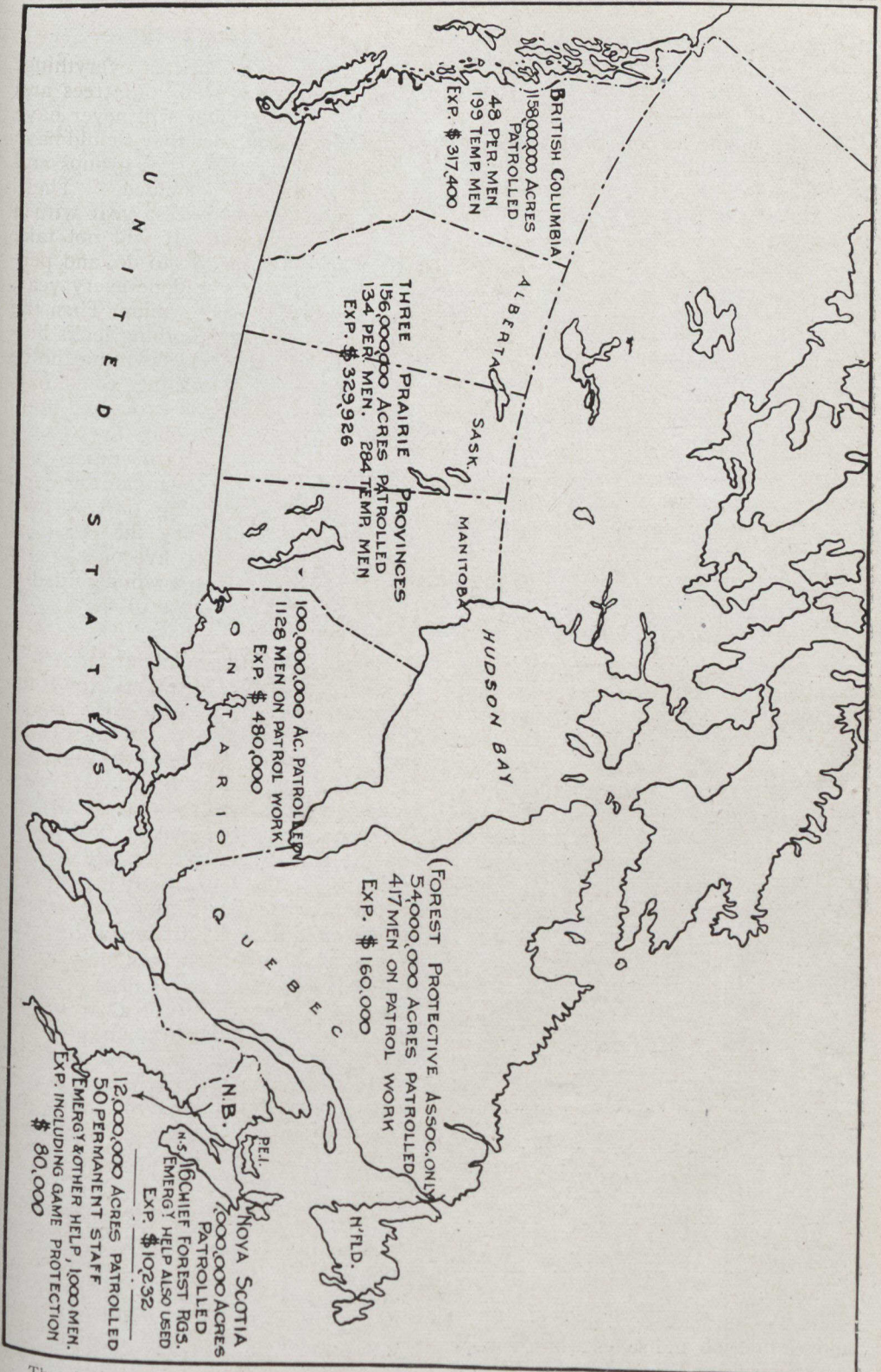
#### *Care of the Park.*

The finish of a Park is everything, and no matter how well your trees and grass are growing, they will never have the pleasing appearance they should have unless the edges of the tree groups and the walks are kept trimmed. These should be gone over once a year with a half moon turf iron. It will not take more than a day or two to do, and perhaps need not even be done every year, but it should be borne in mind. Then the grass should be cut. Nothing looks better than a well trimmed lawn and nothing looks worse than a neglected one. Lawn mower cutting is expensive however, and a run over once or twice a year with an ordinary farm mower will do very well. If the town can afford it, perhaps before some big day, a lawn mower can be run along the edges of walks and tree islands, five or six feet wide. This will make a wonderful difference to the appearance of the Park.

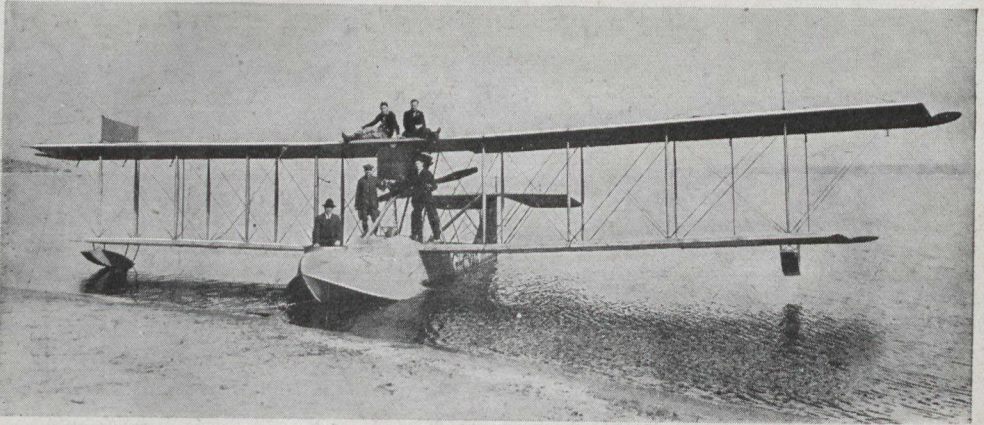
#### *Why the "Islands?"*

This tree island arrangement is the one best suited to small town parks, where you have to make the most of a small piece of ground at as little cost as possible. As we have seen, it costs less to plant and maintain, and besides it makes the Park go further. You see a straight line Park practically all at once, but in this arrangement there is a change of scene every few yards as you proceed along the walks or wander among the grass. New group-effects in the distance spring into view and disclose new stretches of grass curving away behind the trees, each with an invitation to explore still further, so that the whole recreative value of the Park is magnified many fold.

As time goes on and you can afford it, the scenic value can be added to by planting groups of shrubs and flowers on the edges of the tree groups. This will add greatly to the charm of the whole park and it need not be expensive or done right away, and meantime the curving outlines of the walks and tree groups will give you a very fine change from the straight lines so painfully evident both in the country and in town.



The above diagram will give our readers a fairly comprehensive statement of the extent of organized forest guarding in the Dominion. Statistics, of course, do not mirror the whole situation, and no attempt has been made to separate what is spent on personnel and what on construction of "improvements," as telephone lines, lookout towers, etc. The figures are for 1918 in every case except New Brunswick, which cover 1920.



The party engaged in the aerial forestry reconnaissance at Haileybury, Ontario:—Seated on top, Captain McEwen, pilot; H. McClatchey, mechanic; standing, G. H. Edgecombe, Roland D. Craig and Dr. J. M. Swaine.

## An Aerial Survey of the Forests in Northern Ontario

By Roland D. Craig, F.E.

A most interesting experiment in the use of aircraft for forest investigations was recently conducted in Northern Ontario. The Air Board furnished a sea-plane and crew for the joint use of the Commission of Conservation and the Entomological Branch of the Department of Agriculture for the purpose of mapping in the forest areas and also to study the progress of the spruce budworm infestation which is spreading throughout the northern pulpwood forests.

The machine used was a Curtiss flying boat, officially known as the H.C. 2 L. type. It has a wing-spread of 78 feet and is equipped with a 360 h.p. liberty naval type motor. In addition to the pilot, the boat will carry two observers.

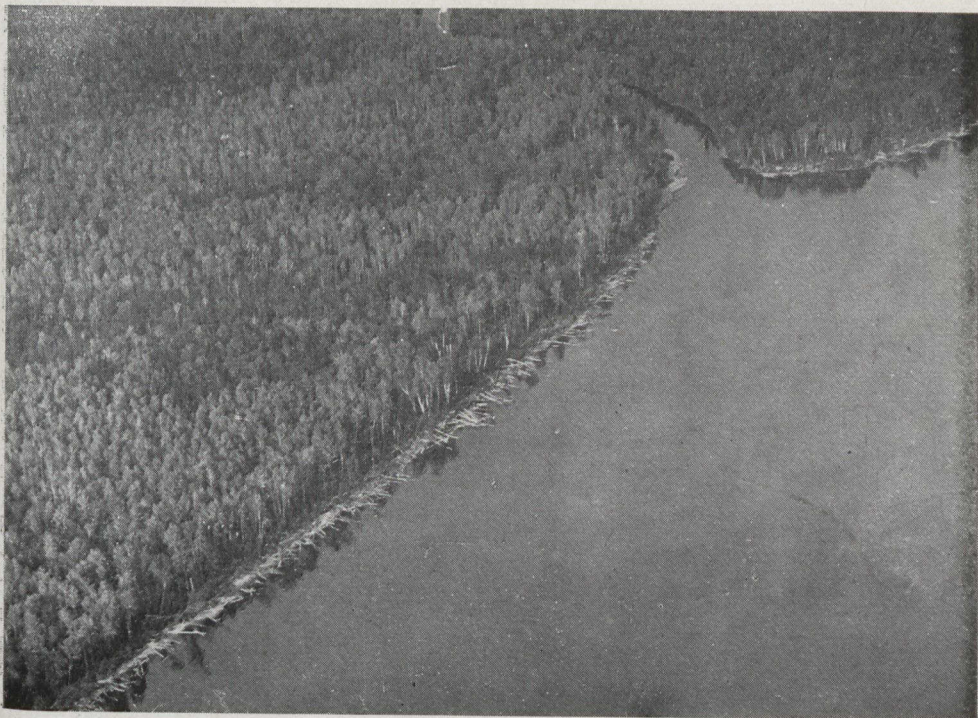
As mentioned in the last issue of this magazine, on September 15th, Col. Robt. Leckie, D.S.O., M.C., D.F.C., piloted the machine from Ottawa to Haileybury with Mr. Clyde Leavitt, Chief Forester of the Commission of Conservation and Dr. J. M. Swaine, Forest Entomologist, as passengers. The trip by way of Mattawa and North Bay, covering 336 miles, was made in five hours flying time. Col. Leckie had to return to Ottawa for his trans-Canada flight and left Capt. P.

Wickens, A.F.C., as pilot. Later Capt. C. McEwen, M.C., D.F.C., relieved Capt. Wickens. Dr. Swaine and Mr. B. M. Dunn conducted the entomological investigations while G. H. Edgecombe and the writer mapped in the forest types. Haileybury was used as a base until Oct. 7th, when the party moved to North Bay and the forest survey continued in that region.

### First Time For Insect Studies.

This is believed to be the first instance in which aircraft have been used in insect studies and the results have proved most satisfactory. In a few hours flying over the region between Kipewa lake and Larder lake, the limits of the budworm infestation and the extent of the damage was determined by noting the discoloration of the affected balsam and spruce trees. This pest has already destroyed millions of dollars worth of balsam and spruce in Quebec and New Brunswick, but it has just made its appearance in Ontario. It is of the utmost importance to the timber owners and the Government to find out quickly the areas affected and the direction in which the infestation is spreading in order that the pulpwood may be utilized before it is rendered useless, which usually occurs





An oblique photograph taken from a seaplane of a section of the north shore of Lake Nipissing, Ontario. The eye can easily detect how the white birch preponderates and where the patches of coniferous trees are located. Experts could easily ascertain from this photograph the approximate stand of merchantable timber on such an area.

within two years after the trees are defoliated. In addition to the aerial observations, a thorough investigation of the infestation is being conducted on the ground in the areas shown to be attacked. Fortunately, the damage in Ontario is as yet comparatively light and is confined to scattered spots between Redwater on the T. & N.O. railway and the height of land and it has not spread very far east of the railway. It is expected that next year the insects will spread from these spots unless prevented by weather or other natural conditions.

#### *What a Flight Discloses.*

In connection with the survey of the forest resources of Ontario which is being conducted by the Commission of Conservation the opportunity of studying the forest conditions from the air was of the greatest value. From an altitude of 3,500 feet, it was possible to map in with a reasonable degree of accuracy the main forest types such as recent burns, muskeg, softwood, hardwood and

mixed forests. It is possible to distinguish even some of the more conspicuous species of trees and with a very limited amount of ground work in the various types, a comprehensive knowledge of the forest conditions over large areas was secured in a short time. In spite of the fact that on more than half the days adverse weather conditions made aerial observation impossible, the foresters were able to map in the broad forest types on 1,800 sq. miles in the three weeks they were operating around lake Timiskaming. It is estimated that to secure the same information on the ground it would have taken two men upwards of eight months. It is hoped that through the co-operation of the Air Board, a much more extensive aerial survey of the forests of Northern Ontario will be undertaken next summer.

When flying over Timagami lake it was possible to see both lake Nipissing and lake Timiskaming which are ninety miles apart. From this point, several small fires, evidently settlers' clearing

fires, were noted in the vicinity of North Bay over forty miles away and also some north of New Liskeard, at an equal distance. If these fires had been a source of danger, their exact location could have been determined in a few minutes and, if necessary, rangers and fire-fighting equipment could have been landed on the nearest lake in an hour. In this region, where there is such an abundance of lakes, the sea-plane is the most satisfactory type of machine to use, for smooth open landing places for aeroplanes are few and far between in the forest.

#### *The Blight of Fire.*

This aerial reconnaissance plainly revealed the widespread damage wrought by forest fires in the Timagami Forest Reserve. When travelling along the lakes and rivers one gets the impression that the area is very largely covered with virgin stand of pine, but from above, the prevalence of the white birch and poplar growth, or bare rocks, shows that immense areas have at one time or another been burned over, leaving a comparatively small percentage of the original forest. There is very little evidence of recent

fires, which reflects credit to the fire protection service in that district.

#### *Trees Are Re-establishing.*

Except where the fires have been so severe that the thin covering of soil on the rocks has been destroyed, poplar and birch very quickly become established and, except where fires have occurred repeatedly, nature has also established an excellent reproduction of conifers. These young red pine, white pine, jack pine, spruce, balsam and cedar struggle along under the shade of the faster growing broad-leaved trees, but in time they surpass these temporary species and dominate the stand. It would cost millions of dollars to replant the area to the same extent which nature has reforested it, and now only protection from fire is necessary to secure another stand of valuable timber. The development of the softwoods would be greatly stimulated if the poplar and birch were removed, but until a market is developed for this material, this cannot be considered economically feasible and nature's slower method will have to be depended on.

## *Australia Sets Aside Large Reserves*

At a conference held at Melbourne of the Premiers of all the States of Australia, it was decided—

- (1.) That an Australian School of Forestry be established in New South Wales, and the cost and maintenance of the school be borne by contribution from each State on a population basis, and a subsidy from the Commonwealth equal to one-sixth of the total contributions from the States.
- (2.) That an area of 24,500,000 acres be set aside as a permanent national forest for Australia.

It is happily clear from these resolutions that the leaders of the Governments of Australia recognize the urgency of the forest position, and are prepared to adopt a remedial policy on an adequate

scale. The acreage of 24,500,000 referred to is based on data supplied by the forest authorities of the various States, and consists of the whole of the prime timber country of Australia. This area, when compared with the total area of the Commonwealth, 1,903,360,000 acres, works out at only one per cent. But these figures do not convey an adequate conception of the forestry position. It must not be lost sight of that the topographical and climatic conditions of Australia are unique and, if it is recollected that only a very limited portion of the whole of the Commonwealth enjoys a sufficient regular rainfall for the growth of large timber, the area to be reserved assumes an entirely new complexion, and bears a rather more satisfactory relationship to the real resources of the country as regards land suitable for timber growing.



How the United Kingdom will restore the forests destroyed during the war. Photo by Clyde Leavitt  
A thriving plantation of Douglas Fir in the Crown Forest of Dean.

## Forest Research in Canada

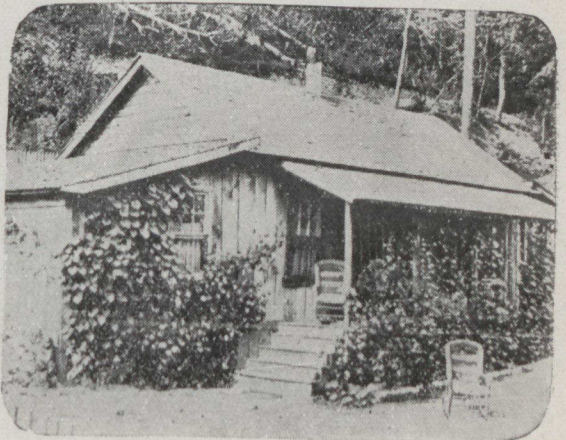
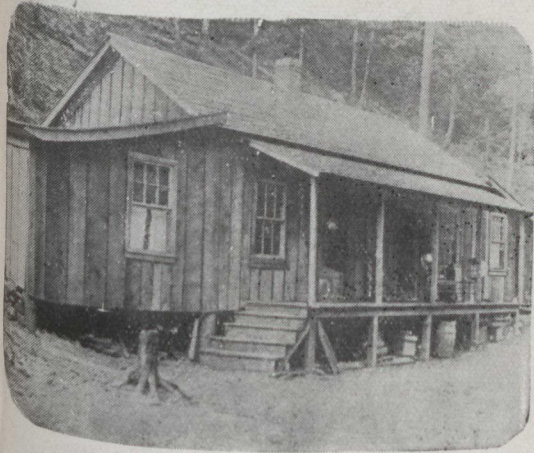
By Clyde Leavitt

Chief Forester of the Commission of Conservation

At the Imperial Forestry Conference, held during the past summer at London, England, great stress was laid upon the urgent necessity for a comprehensive scheme of forest research, to serve as a basis for the intelligent handling of the forest with a view to its perpetuation by wise use. It is generally recognized by those who are familiar with conditions, that lack of intelligent direction in the

methods of forest exploitation results usually in the deterioration of the quality and quantity of the succeeding forest, if, indeed, the forest is not entirely destroyed and the land rendered wholly unproductive as a result of the treatment given it.

The effects of repeated forest fires in bringing about forest devastation are now quite generally recognized, and ob-



Boards will make a house, and a little attention to planting will make it a home.

ject lessons are plainly to be seen in all parts of the country. There is, however, less recognition of the serious effect upon the composition of the forest brought about by the lack of intelligent regulation of the methods of carrying on cutting operations. For example, white pine, formerly the premier timber tree of Canada, has largely disappeared from great areas where it was formerly plentiful and formed the foundation for the early prosperity of the timber industry of Eastern Canada. The methods of cutting were such as to favor the increasing preponderance of the less valuable species.

#### *The Decline of Spruce.*

Similarly, today, spruce, the premier pulpwood species, is being steadily driven out of our eastern forests as a result of heavy cutting for pulpwood

and lumber, with but little conscious attempt to so modify the methods of logging as to ensure the continuously satisfactory regeneration of this valuable species on cut-over lands. In very many cases, all the merchantable spruce is taken, but only a percentage of the less valuable and shorter-lived balsam, and generally none of the hardwood species, of which birch is the most conspicuous example. The inevitable effect of such treatment is to increase the proportion of hardwoods and balsam in the succeeding forest, providing the area is fortunate enough to escape the ravages of successive fires.

Authentic information as to the effects of fires and of different methods of cutting upon the composition and growth of the forest is absolutely essential as a foundation for any intelligent system



Group of foresters visiting camp at the forest experiment station maintained at Lake Edward, 15 miles from Grand Mere, P.Q., through co-operation of the Commission of Conservation, Entomological Branch, and Laurentide Company, Ltd. The occasion was the annual conference of the North-Eastern Foresters, held this year in Canada for the first time. Standing, left to right, Dr. C. D. Howe, Acting Dean, Faculty of Forestry at Toronto; W. G. Hastings, State Forester of Vermont; A. E. Moss, Asst. State Forester of Connecticut; R. W. Lyons, Forestry Department of the Laurentide Company; R. D. Craig, Commission of Conservation; L. S. Webb, Asst. Provincial Forester of New Brunswick; Dr. J. M. Swaine, Dominion Entomological Branch. Seated, left to right: Hon. Wm. A. L. Brazeley, Commissioner of Conservation of Massachusetts; C. P. Wilber, State Fire Warden of New Jersey; Austin Cary, U.S. Forest Service; Prof. R. S. Hosmer, Dean, Forestry Dept., Cornell University; W. G. Wright, Dominion Forestry Branch. The North-Eastern Foresters had previously visited the forest nursery and planting operations of the Quebec Forest Service at Berthierville and the similar work of the Laurentide Company at Grand Mere and Proulx. Only a few of them were able to spend the additional time for the further visit to the permanent sample plots and other forest research work at Lake Edward. Photo by G. A. Mulloy, in charge of project.

of forestry practice. One of the resolutions adopted at the Imperial Forestry Conference at London dealing with the situation in Canada, set forth that, important as are researches in the technology of wood, it is of even greater urgency to carry on investigation, on an adequate scale, into such fundamental questions as seeding and regeneration, and rate of growth and outturn of forest crops.

In Canada, only a comparatively small beginning has been made in this direction, due largely to lack of sufficient funds, the scarcity of trained investigators, and an inadequate appreciation of the need for such information, coupled with pressure for the assignment of qualified technical men to administration as distinguished from research.

All this means that a great deal of research must be carried on, if the necessary fundamental knowledge is to be gained. This, in turn, will require the services of many trained investigators, to say nothing of the many well-trained and thoroughly experienced foresters of mature judgment, in both public and

private employ who will be necessary to see that the information thus gained is actually made effective on the ground, to the end that the forests may be perpetuated by wise use, instead of destroyed through unregulated exploitation, as has so generally been the case in the United States, apart from the National Forests, to say nothing of great areas of the most accessible of our own non-agricultural lands.

It should be remembered that, so far as Crown lands are concerned, it is the respective Governments having jurisdiction over these lands that are primarily responsible for the absence or existence of adequate restrictive cutting regulations and for their enforcement, if there be such. No general advance along the line of scientific forestry practice on Crown lands is to be anticipated except as prescribed by Governmental authority, notwithstanding that progress in individual cases may take place on the initiative of some of the more progressive concerns. From this viewpoint, it is of the greatest importance that every Governmental agency having to do with the ad-



One of the permanent sample plots on the lands of the Bathurst Lumber Company, New Brunswick. The area in the foreground has been clean-cut and the tops lopped and left lying on the ground. Rapidity of decay under these conditions will be observed, from the viewpoint of ultimate reduction of the fire hazard, and careful observations will be recorded periodically of the extent and character of the natural regeneration which will take place on the area, and the results compared with those on other areas where the slash has been left untouched, and where it has been piled and burned. Similar studies will be made on areas logged to different diameter limits, and all the results will be compared, with a view to determining the best methods of silvi-cultural treatment for these conditions. This project is being carried on, through a co-operative arrangement between the Bathurst Lumber Company, New Brunswick Forest Service and the Commission of Conservation. Photo by W. M. Robertson, in charge of project.

ministration of Crown timber lands should carry on a definite programme of forest research, to the end that the continuity of Governmental forest revenues may be assured, and that the many large and important wood-using industries may be assured of a permanent supply of raw material with consequent benefit to the whole economic structure of the country.

#### *Agencies at Work.*

Among the Governmental organizations which have made at least a beginning in forest research are the Dominion Forestry Branch, Quebec Forest Service, New Brunswick Forest Service, Ontario Forestry Branch, British Columbia and the Commission of Conservation. In addition, a number of the pulp and paper companies have done some work along similar lines, either independently or in co-operation with the Commission of Conservation.

The research work of the Commission of Conservation was started as early as 1912, when a survey was made of the Trent Watershed area, Ontario, under the direction of Dr. B. E. Fernow, Dr. C. E. Howe and J. H. White. This study, which was continued in 1913, revealed much valuable data as to the conditions

of regeneration on this logged-over area, much of which had suffered seriously from repeated forest fires, with consequent deterioration in the composition of the second growth. The effect of repeated fires in reducing the occurrence of white pine in the regeneration was particularly noticeable.

In 1914, a study was made by Dr. Howe of the reproduction of commercial species in the southern coastal forests of British Columbia. This work was done in co-operation with the British Columbia Forest Branch. One of the conclusions was that light burning of the logging slash and of the dense undergrowth gives the best reproduction of Douglas fir. The need was emphasized for regulated slash-burning and for a more rigid fire protection on the areas already covered with young growth.

Beginning in 1917, the Commission inaugurated, under the immediate direction of Dr. Howe, a programme of investigation to determine what technical measures are necessary to ensure the perpetuation of the vast pulpwood forests of Eastern Canada. In providing for these studies, a somewhat unique development has taken place, under which co-operation has been developed



Another sample plot on the lands of the Bathurst Lumber Company, New Brunswick. Here, the area has been logged practically clean, and slash-burning is under way, after a light snow-fall. The burning of logging slash in piles, after a light fall of snow, is perfectly safe. The object of slash-burning is to reduce the fire hazard. Comparative studies are to be made through a period of years, of the natural regeneration on areas handled under different methods of treatment. Photo by W. M. Robertson, Commission of Conservation.

between the Commission on the one hand, and the Laurentide and Riordon Companies in Quebec, Bathurst Lumber Company and the New Brunswick Forest Service in New Brunswick, and the Abitibi Power and Paper Company and the Spanish River Pulp and Paper Mills in Ontario. These co-operating organizations have borne a share of the cost of collecting data in the field, under the foresters of the Commission.

#### *Getting Down to Brass Tack.*

The investigations under way involve a study of the present methods of cutting upon the character of the forest, the amount and kind of natural reproduction, the rate of growth which is taking place, and the effect of forest fires upon the future of the forest. The astonishing development of the Canadian pulp and paper industry during the past few years is of such tremendous importance in the economic and industrial life of the country that too much emphasis can not be placed upon the necessity for ensuring a perpetual supply of the raw material so vitally essential to the continued existence of this great industry. To this end, a vast amount of research will be necessary, challenging the best efforts of all the various agencies, both public and private, which may be in a position to engage in such work.

Sight should not be lost of the fact that the forest resources of Canada amount all together to only about one-third of those of the United States. In the United States, the process of forest devastation has proceeded to a point which is causing the greatest alarm in well-informed circles, both public and private. It is generally admitted, for example, that exploitation of the forests in that country is taking place four times as fast as the forests are growing. One great forest region after another has been largely depleted of its forests, so

that the East is to a constantly increasing extent becoming dependent for its forest products upon the west or upon Canada. All this is the direct result, first of lack of protection against forest fires, and, secondly, of the almost complete absence of any regulation of the methods of cutting with a view to leaving cut-over lands in a condition to produce another crop of valuable tree species.

In Canada, while our forests are unquestionably of great extent, they are by no means inexhaustible. Fires have caused untold damage in the past, and still continue to take their toll each year, though the situation in this respect has certainly improved. Nevertheless, in no province can it be said that fire protection is yet on an adequate basis. Forest insect pests and fungus diseases cause annual losses even greater than those due to fires.

#### *What of the Diameter Limit?*

So far as the practice of scientific forestry is concerned, conditions are still in a most primitive stage of development. Nearly everywhere, the aim of the operator is the greatest immediate profit, leaving it to Nature to determine the character of the future forest, if any. True, in most of the provinces, diameter limit regulations are prescribed by Governmental authority to govern cutting on Crown lands. It has been shown, however, that diameter limit regulation does not provide at all satisfactorily for the reproduction of the more valuable species in our mixed forests. It is perfectly obvious that the method of treatment must be adapted to the conditions on the ground, and that these conditions will vary materially between different regions, and with the various types of forest and of soil and moisture conditions in each type.



**DON'T START SOMETHING YOU CAN'T STOP!**

Nearly all forest fires commence with a pair of human hands—the cigarette, the camp fire, the match, the settler and his land-clearing, the railroad locomotive.







#### HOW TO DRIVE OUT POPULATION.

These illustrations might easily be taken haphazard from a moving picture film photographed in any Canadian province. Eighty per cent. of the habitable portion of Canada is unfit for agriculture, and is fitted by nature to produce only one crop—timber. If we are to accept the estimates of leading authorities, two-thirds of this great tree growing area is to-day producing no material of merchantable value. This fact opens up the greatest problem Canadian governments face at the present day.



# Rewards for Trained Foresters in Canada

By Dr. C. D. Howe, Dean Faculty of Forestry, University of Toronto  
(Fourth Article of series on the Training of a Forester)

The outline of instruction given in the three preceding articles is based on that at the University of Toronto. This forestry school was founded in 1907 and for twelve years was under the enthusiastic and far-seeing guidance of the leader of forestry on this continent, Dr. B. E. Fernow. Several hundred former students and all those believing in the perpetuation of our forest resources by wise use look with very keen regret upon his retirement because of enfeebled health.

The graduate of the school receives the degree of Bachelor of the Science of Forestry (B.Sc.F.). . . A six years' course is also given which leads to degrees in both Arts and Forestry. The entrance requirements are those imposed for Junior Matriculation in the Arts courses of the University. It is expected that they will be raised to Senior Matriculation within the next two years.

There are two other forestry schools in Canada, one connected with the University of New Brunswick at Fredericton and the other with Laval University at Quebec City. A forestry school is in the process of making at the University of British Columbia, but as yet no courses have been offered.

## *New Brunswick's School.*

The New Brunswick forestry school began operations in 1908 under the able leadership of Professor R. B. Miller, who last year was succeeded by Professor A. V. S. Pulling. After four years the graduate receives the degree of Bachelor of Science in Forestry. The first two years of the course coincide with the first two years in Civil Engineering and a five years combination course in Engineering and Forestry is given. The school has a 25 acre practice ground adjacent to the University campus and a forest tract of 3,600 acres within easy accessibility, where the practical work of the course is carried on. New Brunswick has thirty-eight graduates in Fores-

try, nineteen of whom are in government service and ten employed by lumber companies. Six of them are not working along forestry lines. The New Brunswick men are well trained and they are performing an important service in all that pertains to forestry. It is to be regretted that, compared with the others, the New Brunswick Forestry School has such a meagre financial budget on which to work. With proper support in this respect, its good influence could be materially extended.

## *Laval's Good Work.*

The Laval Forestry School was founded in 1910 and for nine years was under the illustrious leadership of Mr. G. C. Piche, the present Provincial Forester, and his associate Mr. Avila Bedard, who is now the Director of the School. These gentlemen always laid particular stress upon the practical side of the students' training and last year by a special act of legislature the School was designated the School of Surveying and Forestry and a still larger portion of the instruction was given to surveying and engineering subjects. At the end of the four year course the successful student is given the degree of Forest Engineer and Bachelor of Science in Surveying. The entrant must pass an examination set by the directorate of the School, unless he already possesses a bachelor's degree in Arts or Science. The Laval Forestry School was founded for the express purpose of furnishing technically trained men for the intelligent management of the forest resources of Quebec, and thirty-three of the fifty-four graduates are employed for that purpose by the Department of Lands and Forests. The progressive attitude of the Quebec government in forestry matters reflects much credit upon its advisers.

## *145 Graduates in Forestry.*

Thus it will be seen that the three schools have produced around 145 grad-

uates in Forestry in the dozen or more years of their existence. A little more than one half of these, 79, are in Dominion or provincial government service, and approximately one quarter of them are employed by lumber companies or pulp and paper companies.

The reader who has followed these articles thus far may be interested in a statement as to the opportunities in forestry work. As indicated in the preceding paragraphs, the majority of the forestry school graduates thus far have entered government service. The principal employers are the Dominion Forestry Branch, the Forest Service of Quebec, the British Columbia Forest Branch, the Ontario Forestry Branch, the New Brunswick Forest Service, and the Commission of Conservation at Ottawa.

The work of the Dominion Forestry Branch that administers some 22,500,000 acres of forest land in the four western provinces may be taken as fairly representative of government service. According to the Civil Service regulations the graduate ranks as a forest assistant and he starts in on \$1,320 a year, with traveling and living expenses when in the field. He may be called upon to act as an assistant in almost any kind of work, such as estimating timber, making boundary surveys, making maps showing forest conditions, topography and drainage; constructing roads, trails and telephone lines; building bridges, cabins and lookout towers; fighting fires and guarding against trespassers; marking timber for cutting, scaling logs, burning slash and doing reforestation work.

#### *The Salary Reward.*

The term as forest assistant is a period of apprenticeship and testing the qualities of the man and lasts two or three years or longer according to individual cases. If the forest assistant makes good, he next steps into the grade of forester, with an initial salary of \$1,680, with field expenses paid. His work is practically the same as before, but he is given positions of increasing responsibility and is encouraged to use his head more than his brawn. In fact, he has the opportunity to prepare himself for the higher administrative posi-

tions and he may pass next to the grade of superior, when he will have charge of a forest, which may vary from a few hundred to a million acres in extent. A supervisor starts in at \$1,800. The superintendent of forest reserves begins on a salary of \$2,100 and goes to \$2,580. He administers several reserves. The Dominion Forest Reserves are divided into four districts, one in each of the western provinces. The district office administers all the reserves within the province. The District Forester Inspector at Calgary, for example, has charge of more than 12,000,000 acres of forest. This officer begins with a salary of \$2,880 and may go to \$3,360. At the present time there are only two or three positions in the Forestry Branch that pay salaries higher than this. All the salaries indicated above carry a substantial bonus for men with families and for single men with salaries below \$2,100.

The work in provincial forestry branches is similar to that outlined above. Local conditions, however, bring about variations in the emphasis of the work. For example, in one province fire protection may be stressed and in another timber scaling or in still another it may be the examination of timber lands preparatory to leasing. With one or two exceptions the salaries in provincial services are lower than in the Dominion service.

#### *The Demand for Forest Engineers.*

There is an increasing demand from lumbermen, especially pulpwood operators, for men trained in engineering and forestry. With cheap stumpage and an overflowing supply, rough and ready rule of thumb methods in the woods and in the mill were adequate, but with the present high prices and with at least an uncertainty as to future supply, much closer utilization is possible and the checking of waste profitable. In many cases, however, the new problems which the new conditions bring are proving too knotty for woodsmen with only empirical knowledge and the managers of the more progressive companies are turning to technically educated men. This trend is particularly noticeable in timber cruising. The limit owners now demand de-

finite data from actual measurements rather than guesses from ocular estimates. About a dozen and a half pulp and paper companies in Eastern Canada employ foresters and for the most part they are engaged in stock-taking to determine the present supply and in growth studies in order to predict the future supply. Their reports are usually accompanied by maps, showing topography and drainage, and plans for closer utilization of materials and the reduction of waste in logging and driving operations. Some twenty or more undergraduates in Forestry at Toronto were working on timber cruising parties during the past summer and as many more could have been placed had they been available.

Reforestation by planting is each year taking a more important place in the forestry plans of pulp and paper companies. Some of them are practically committed to the policy of planting annually a number of trees equal to those cut each year. The forest planting plans of provincial governments in the East are also rapidly expanding. Reforestation work will claim the attention of an increasing number of forestry school graduates in the future.

#### *More Pay in Private Service.*

As a whole, the salaries of foresters in private service are higher than those in government service—a condition that does not apply to the forestry profession alone. Naturally, no definite schedule of salaries can be given. Several men in private employment are reported to be earning more than \$6,000 and perhaps in one or two cases as high as \$10,000 a year.

Forestry students who are intellectually inclined and are attracted by the question marks scattered so abundantly throughout the forest and bristling out of nearly every process in a pulp and paper mill may find abundant opportunities for research work. At the present time the supply of properly trained men for this kind of work is much smaller than the demand.

If a young man gets more enjoyment out of the mere making of money than he does from constructive work he would better not enter the profession of forestry. If he is content with a salaried position that gives certainly as much and probably more opportunity for individual development and constructive accomplishment than any other profession, then he will find satisfaction in forestry.

## ***Paper from Wood Pulp Made in England in 1801***

By the kindness of Sir Mayson Beaton, the Canadian Forestry Magazine has been privileged to look over a most interesting and rare book which claims to contain the first sheets of paper made from wood fibre in the British Isles. The book was written by Matthias Koops in 1801 and is entitled: "Historical account of the substances which have been used to describe events and to convey ideas from the earliest date to the invention of Paper."

Mr. Koops, who was a practical paper maker asserts that the book, contains the first paper made from both straw and wood pulp, with no admixture of rags or other vegetable material.

"I am able to produce to the public," says the author, very strong and fine

paper made from straw and wood, without any addition of any other known paper stuff, notwithstanding that I have not yet had the advantage of making it in a mill, regularly built for such a new undertaking."

One section of the book appears on an excellent make of wood pulp paper, and the section printed on straw paper is almost equally attractive. Mr. Koops claimed that he had invented a process to restore waste paper to its original condition by the extraction of the ink. As far as the Forestry Magazine is aware, no such process is today in successful operation, although inferior wrapping papers are manufactured from waste newspapers.

# Extending Irrigation in Canada West

By H. B. Muckleston



The problem of making three blades  
of grass grow where none  
grew before

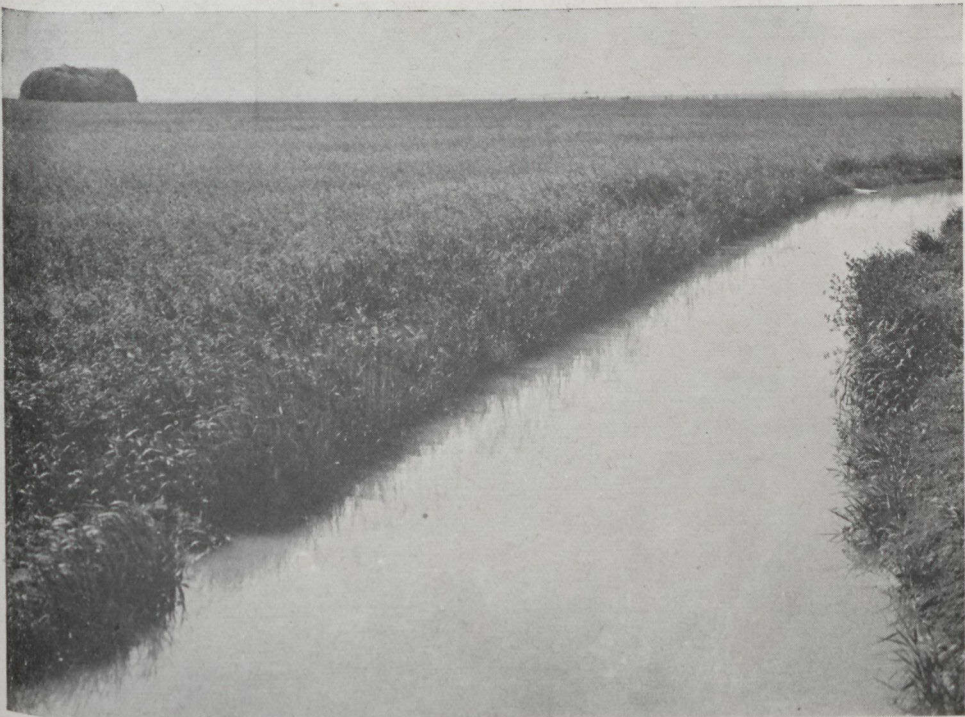


*"I have made the watercourse to be a blessing for the people of Shumir and Accad. I have spread the waters upon the desert. I have made the water to flow in the dry channels and changed the desert into well watered lands. I have given them fertility and plenty. I have made them the abode of happiness."*  
(From the Tablets of Hammurabi.)

The document from which the above text is quoted was written something like three thousand years before the beginning of the Christian era by an Assyrian monarch, but it sums up as well

for this day as it did then the great things which the further extension of irrigation can do for the prosperity of Western Canada. To the uninitiated the word irrigation unfortunately connotes deserts and famines and other undesirable features, but to those who know what irrigation really means the associations are very different. To them it means intense cultivation, co-operation, peace and plenty, "the abode of happiness."

Irrigation is nothing more than the extension on a large scale of a practice indulged in by every housewife when she waters the carefully tended plants in her



An irrigated field of meadow grass at Brooks, Alberta, 1919.

parlor window, or by the proud husband when he uses the garden hose on his lawn, and this form of irrigation is considered necessary even in the most humid parts of Ontario.

All irrigation works may be put into one of two classes, preventive or productive. Where some sort of crop can be grown with reasonable certainty without artificial watering, but much better and more remunerative crops can be secured by its aid, the works are in the productive class. Where agriculture without irrigation is impossible or very precarious the works are preventive. Naturally in any new country the works first undertaken are preventive and it is only after these are well developed that the productive works get under way.

It is generally realized what a large proportion of the cultivatable land on the earth's surface is susceptible of benefit from irrigation. If we consider the arid lands alone where agriculture is otherwise impossible or precarious the proportion is large, but if to these we add those areas where agriculture is improved by irrigation the total is enormous, nearly 70 per cent. of the whole.

There is an old proverb relating to the man who makes two blades of grass grow where one grew before, but what about him who makes three grow where before there were none.

#### *Precarious Conditions.*

Agricultural statistics for Western Canada show very plainly that there is a large area in Alberta and Saskatchewan roughly bounded by the mountains, the Red Deer and South Saskatchewan, the 49th parallel and an indefinite line somewhere about the longitude of Moose Jaw, wherein crop production is more or less uncertain and precarious. There is also a border territory north and east of this in which agriculture is not developed to anything like its best by reason of insufficient rainfall. It is an unfortunate fact that to too many people agriculture means grain. Western Canada has been called the "bread basket of the Empire," and perhaps it is, but it should be the butcher shop and the vegetable garden as well. This will never be possible until the waters of the prairies are put

to work and the artificial application of water developed to the fullest extent which the conditions allow.

Hitherto the bulk of the development has been under corporate control. A relatively large amount has been carried out privately or by co-operation, but these projects have all been small and scattered. The time has now arrived when large projects must be developed by co-operative organization, and this can only be possible when the co-operation includes every interested agency. Development of a large project involves many operations such as preliminary and reconnaissance surveys, organization, finance, construction and the subsequent management and maintenance. In addition there are certain matters such as the surveys of sources of water supply, the administration of these sources as between projects and provinces and also internationally, the provisions of laws relating to the use and distribution of water, construction of works, organization, governing and financing of the co-operative societies and agencies.

#### *Provincial and Federal Action.*

These things come under different authorities. At present, the natural resources, which includes all surface waters, are under federal jurisdiction and the federal government therefore exercises authority in all matters relating to the utilization of water. The Province governs in all matters relating to organization, management and finance. The responsibility for further development is, therefore, a divided one. The Federal Government by its legislation makes itself responsible that water is put to beneficial use and its part therefore is to determine the location and the amount of the available supply and the lands on which it can be best used; and also to insure that the works are sufficient for their service. The remaining steps in development are Provincial matters. It is evident, therefore, that development cannot continue unless each agency does its part. At present the Federal Government has a large and efficient organization at work on its part of the program, and has carried out and is continuing extensive surveys to de-

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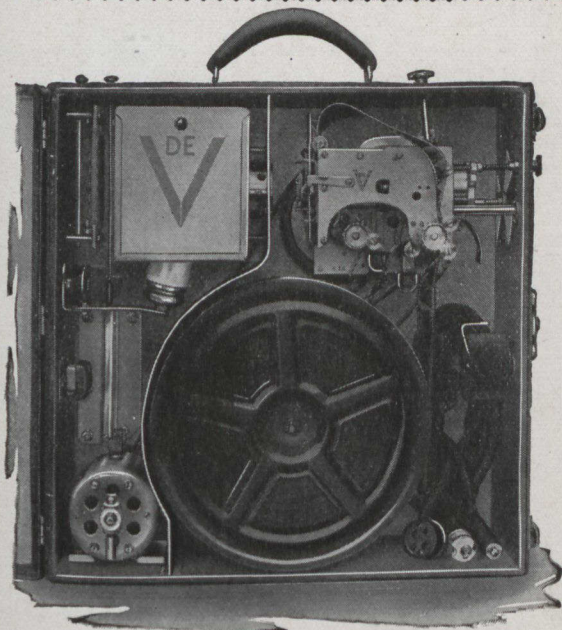
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termine just what water is available and where that water can best be used. The Provinces have provided the necessary legislation to govern their part of the work and it only remains to make the Federal and Provincial machinery work in harmony and co-operation in order to ensure progress and success.

*The Question of Finance.*

The main shoal on which the craft may ground is that of finance. Except in very small projects the cost is too great to be paid by assessment and if active development is to continue it must be by borrowed capital. At the present time this class of security is not familiar to Canadian capital and in any event the amount which will be required is so large that outside sources must be sought. The only supply in sight at the present time is in the United States where irrigation bonds in times past have not always been remunerative and where the

local legislation and other factors are not well understood. However, if the first developments undertaken were proved sound and the legal machinery workable, subsequent development should be much more easily financed. The Provinces feel that the burden of proof is at least equally divided between the Federal and the Provincial Governments and that some mutual arrangement should be arrived at whereby the earlier steps in co-operative development can be made easy. The settlers unaided can go so far only. They are willing and able to carry the load but require some help in getting it on to their shoulders. Given that help they know the result. They know what irrigation means—a more contented because a more prosperous people. It means better homes and more of them, a better citizenship, better schools, better opportunities for everybody to make good.

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### Wireless 'Phones for Fires

Speaking at the Pacific Logging Congress, Mr. M. A. Grainger, Chief Forester of British Columbia gave an account of the use of the Wireless Telephone in forest protection. In May and June of this year installations were made on three shore stations and on five of the launches used by the coast rangers. There have been certain difficulties to overcome. Large wireless stations on the coast cause interference, and in the neighborhood of Vancouver the street car service and other high power lines create an obstacle, but, in spite of these, good results have been secured. As an instance of this, a lumber company in Vancouver heard that a fire had started in its holdings a hundred miles away and was in conversation with the local ranger in half an hour and had his report first thing next morning.

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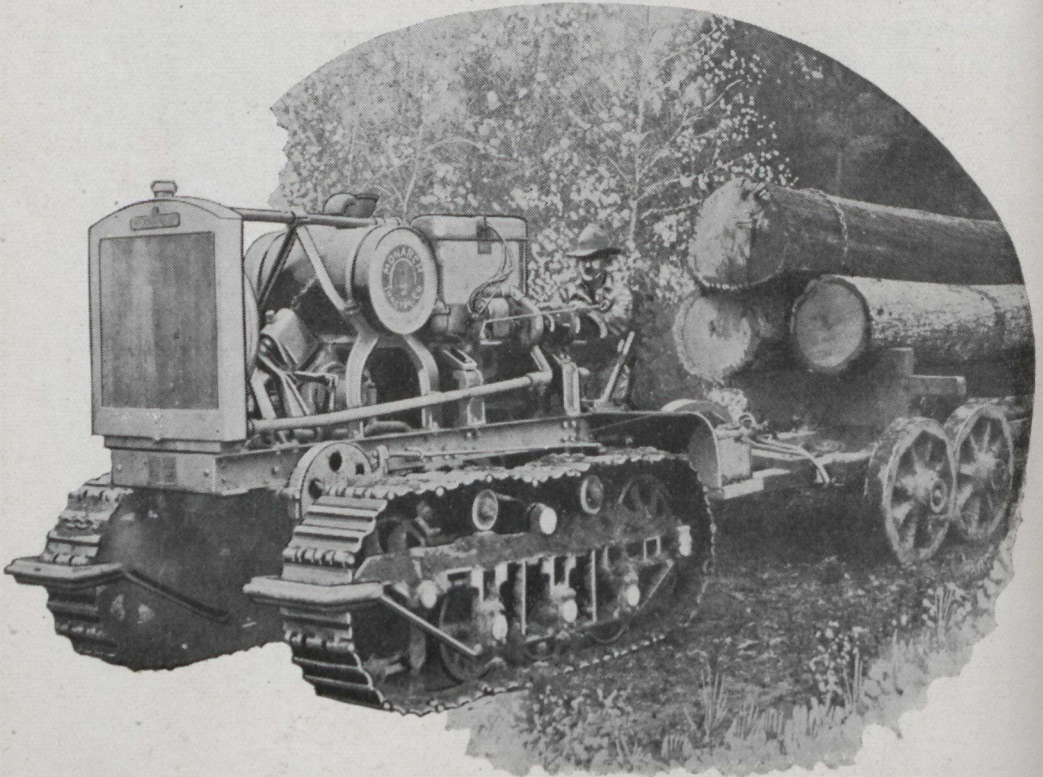
And these broad treads grip the ground over an immense surface.

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Robson Black, Esq.,  
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Dear Sir.—I am directed by my Council to express their appreciation and thanks for the great trouble taken by Mr. Archibald Mitchell in preparing sketch Plan of Park showing how same could be made a beauty spot and a great asset to the town, and I am pleased to inform you that Council purpose carrying out the suggestions made by Mr. Mitchell, and hope to have the work under way early as possible next spring, it being too late to do anything in the matter this year.

Kindly convey to Mr. Mitchell the thanks of my Council for

Sketch Plan and suggestions, and assure him they greatly appreciate the interest he has taken in our Park.

I am Dear Sir,  
Yours truly,  
(Signed) H. R. DYER,  
Town Clerk.

“It were difficult to conceive of a better work in the permanent best interests of the people of Saskatchewan than that which is carried on by the Canadian Forestry Association through the medium of its “Tree Planting Car,” says J. B. Muselman in the Regina Leader. “Its car is now touring Saskatchewan and it is gratifying to note that all stations visited, farmers in goodly numbers have been in attendance to hear the lectures, to discuss with the experts their local tree planting problems and generally to secure information on the cultivation of trees and shrubbery on the plains.”

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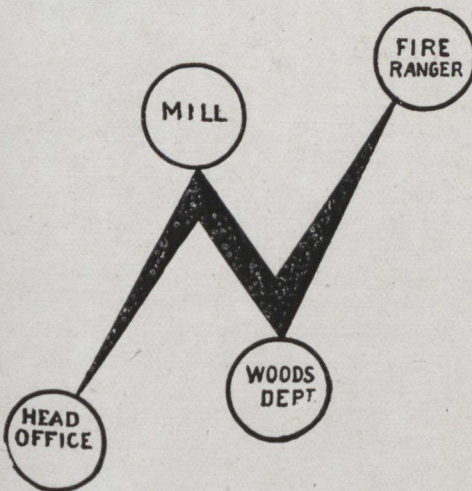
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## Some Forest Fables

No. 1

By Dr. C. D. Howe

Once upon a time a farmer owned a very large field. It extended over many, many acres. The field was covered with a valuable crop. The soil was of such nature that it would produce only this one particular crop. It was too poor to raise hay, oats, potatoes, wheat or any of the ordinarily cultivated crops. Each season the farmer harvested a portion of his crop and sold it in town.

One dry day in summer he discovered a fire in his field. Instead of calling his neighbors to help him fight the fire, the farmer said to himself: "The field is very large. I will let the fire burn. There will be a-plenty left." So the fire burned until it was quenched by rain. The next season, however, the farmer had to go farther from town to harvest his crop. Being farther away it cost him more to get his crop to the market, so he increased the price of his product, or in other words, the consumer paid for the farmer's neglect in protecting his crop.

The following summer another fire destroyed more of the farmer's field. He soliloquised as before: "The field is very large. It extends over many, many acres. There will be a-plenty left. Let the fire burn," and the fire did burn until the coming of rain. He went still farther from town for his next harvest. It cost him still more to get his product to market, and he raised his price to the consumer.

These things were repeated year after year. The farmer said so often: "I have such a large field. There is a-plenty more," that he actually believed it, and he made his neighbors believe it, but each year he went farther from town to cut his crop and each year the consumer paid the additional cost on transportation. Each year the fires burning and re-burning reduced the future crop producing capacity of his field.

This is a real fable. No farmer would stand idly by and see his crop periodically

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244 Notre Dame Street West : : : Montreal.

destroyed by fire. The application, however, may well fall upon you and me, the average citizen who owns the crown timber lands. The lumber industry in Ontario began on the shores of the Great Lakes and along the Ottawa River. Because of unrestricted forest fires the in-

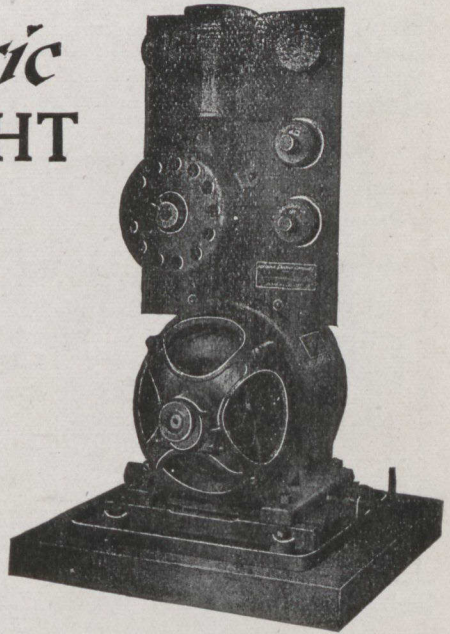
dustry has been compelled to go farther northward and north-westward. In some places it takes two years to get the logs to the mills, and there is now a scramble for pulpwood concessions in the Hudson Bay region.

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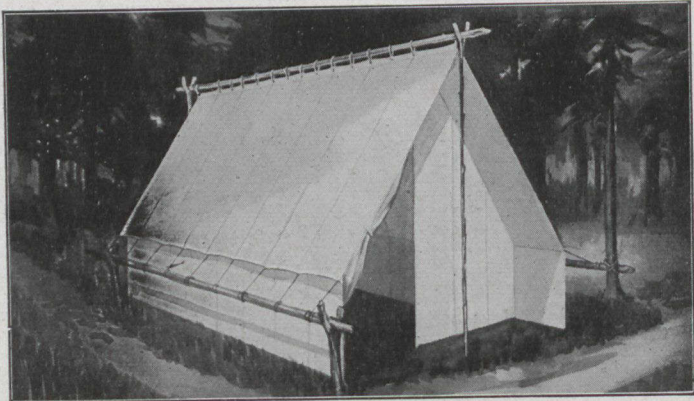
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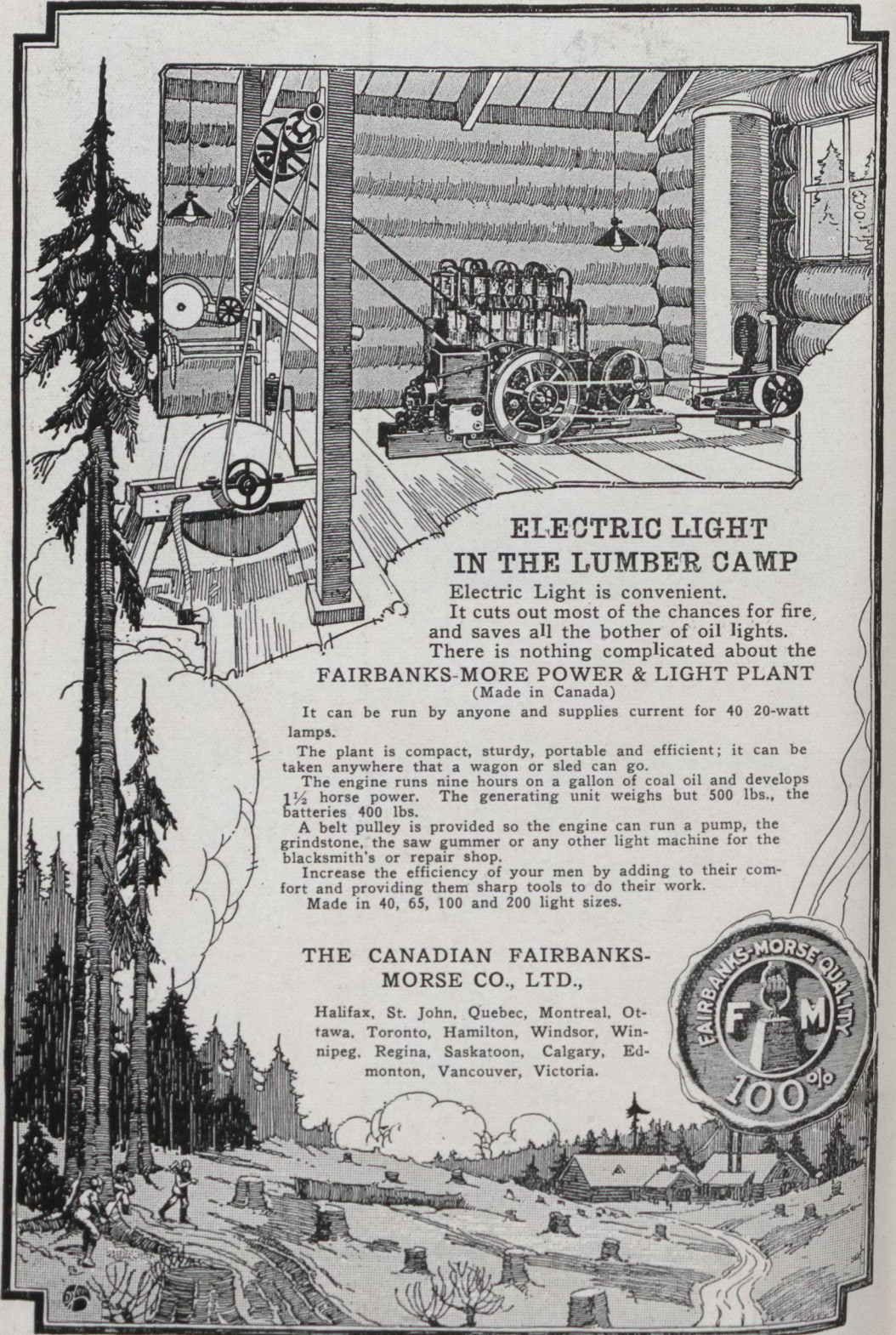
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### Mr. Zavitz Takes Charge

According to an official announcement of the Ontario Government, a long-expected change in Ontario's forest administration has taken place by which virtually the full control of all forestry affairs has been transferred to the charge of Mr. E. J. Zavitz, Provincial Forester. Hitherto Mr. Zavitz' jurisdiction covered forest protection and the reforestation enterprises such as the forest tree nursery at St. Williams, Ontario. The Forestry Magazine understands that Mr. Zavitz will now have control of all branches of timber administration which involves a most important departure from the previous policies of Ontario Governments.

### Forest Fires in B. C.

Nine hundred and eighty-one forest fires were reported to the chief forester of British Columbia to September 15th this year. The cost of fighting and extinguishing these outbreaks is officially recorded at \$182,400. No estimate of the actual amount of timber destroyed

is at present available. The figures read as under or the various districts:

	Fires	Expenditure
Vancouver (including Vancouver island).....	200	\$45,500
Nelson .....	248	65,000
Cranbrook .....	98	40,000
Kamloops .....	75	15,000
Vernon .....	76	15,000
Prince Rupert.....	56	458
Cariboo .....	50	600
Prince George .....	79	1,850

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## **FOREST FIRES TAKE AWAY JOBS!**

SIZE UP EVERY TIMBER FIRE AS YOUR PERSONAL ENEMY  
AND GET AFTER HIM.

**Put Out Your Camp Fire;  
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Dead forests drive out population.

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Canada has not one acre of timber to throw away.

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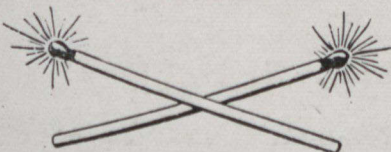
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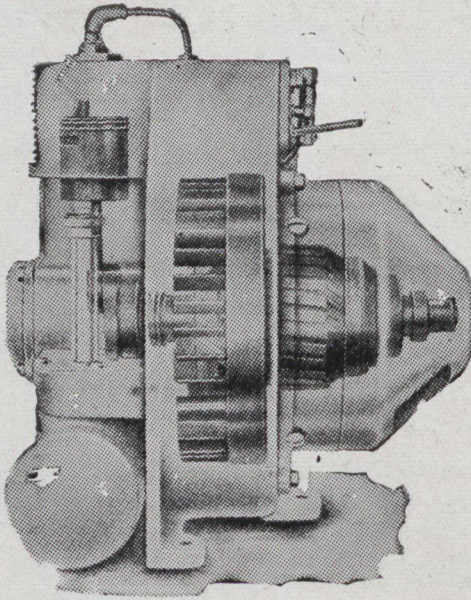
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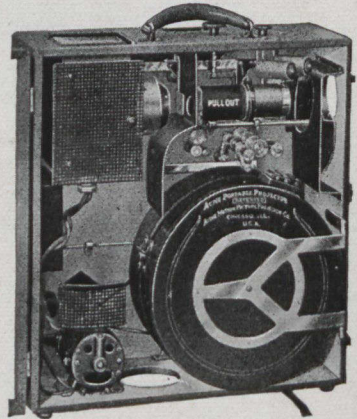


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## How Forest Disease Cuts Our Wood Crop by Half

By James Kay, B.Sc., F.

While a member of a party cruising a tract of virgin timber in Southern British Columbia and Western Montana this summer, I was struck by the large amount of damage done to trees by wood rotting fungi.

Forest fires are spectacular, and combatting them is a source of worry and expense, and the damage and loss is self-evident, whereas the loss caused in the forest by fungi may often escape notice owing to the insidious nature of its attack, the loss may only be evident after felling, or after the trees have been sawn at the mill.

Forest trees are subject to mechanical injuries—snow-break, trees falling and breaking branches and scraping bark off the trunks, bears and deer also damage the stems by tearing and scraping the bark. It is at these injured points that the spores of fungi find lodgement and

if ample moisture is present they will germinate and will develop a white fibrous or matted body called the mycelium, which grows and spreads in all directions in the wood. The wood rotting fungi, however, excrete certain ferments which extract the lignin from the cell walls; also in most cases they are able to dissolve completely the basic structure of the cell wall by other ferments.

The number of fungi which affect the lumberman, most closely, are the bracket fungi, and are broadly represented by the perennial form "Fonces" and the annual form "Polyporus." The species Fonces form hard woody shelf-like structures, and as long as the mycelium can obtain food material in its advance into the wood it will develop a new layer of tubes on the under surface each year. Thus, the size of the fruiting body increases yearly.

The species *Polyporus* produce a fleshy, corky, fruiting body, which rarely functions for more than one year.

*How the Fungi Work.*

The spores of the bracket fungi are borne on groups of four, each in a tiny spine at the ends of the branches of the mycelium which project from the inner sides of the tubes. When mature these spores are shot from their attachment with just enough force to bring them to the centre of the tube, and they then drop out of the open end at the bottom.

The spores are very light and the slightest breeze carries them long distances. Millions of spores emerge from a single fruiting body a few days after they become mature; they are sticky and adhere to any surface with which they come in contact. A large number find lodgement in wounds where infection is possible.

The germ tube of the spore produces

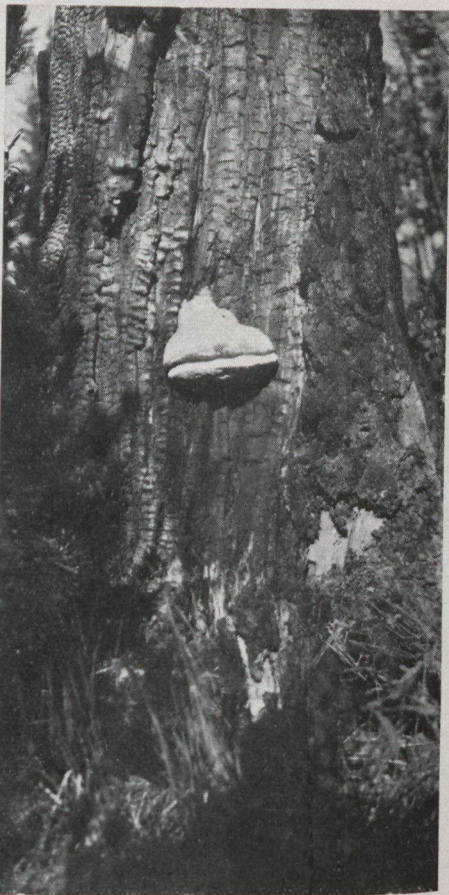


Photo by James Kay.  
How the ever-ready fungus falls upon the weakened tree to complete the work of destruction by inner rot. This Western Larch has been damaged by fire and the Brown Heartwood Rot has quickly formed. Photo taken at Yahk, B.C.

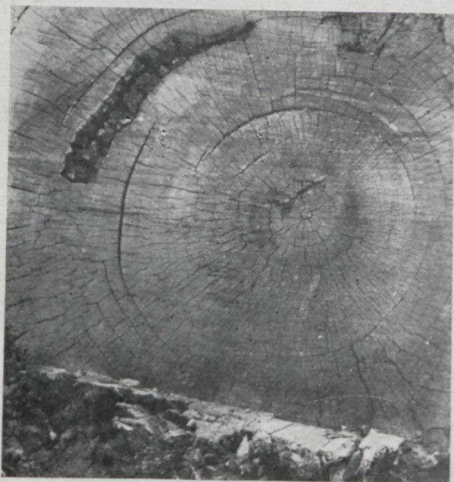


Photo by James Kay.  
**HOW A LOG TELLS ITS EARLY HISTORY.**  
This Western Larch is 335 years old, and is 33 inches in diameter. At fifteen years of age it was damaged by fire and again at 150 years. The scars are plainly visible.

short branches of mycelium which immediately begin the decay of the wood at the point of infection, and soon a large growth of the mycelium occurs, which spreads rapidly.

Conditions in the forest are ideal for the development of these fungi. Large quantities of windfall and branches are lying around; the logger leaves tops,

culls and slash everywhere. These form an ideal nursery ground for the perpetuation and spread of wood destroying fungi.

It has been stated that by eliminating the factor of decay in forms of timber now in use, the saving in the annual cut for replacement would amount in the United States and Canada to nearly one hundred million dollars. Stated in another way we would need to produce less than half the timber now used, if the factor of decay were eliminated. "In the forest under the present system of exploitation in this country the losses from wood-rot reduce immensely the yield of timber."

A simple method of disease control in the forest is burning the slash and all diseased trees at the time of cutting.

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